Engineering Library

JUN 14 1937

MOTOR AGE

A CHILTON PUBLICATION
DEVOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

JUNE
1937

IN THIS ISSUE

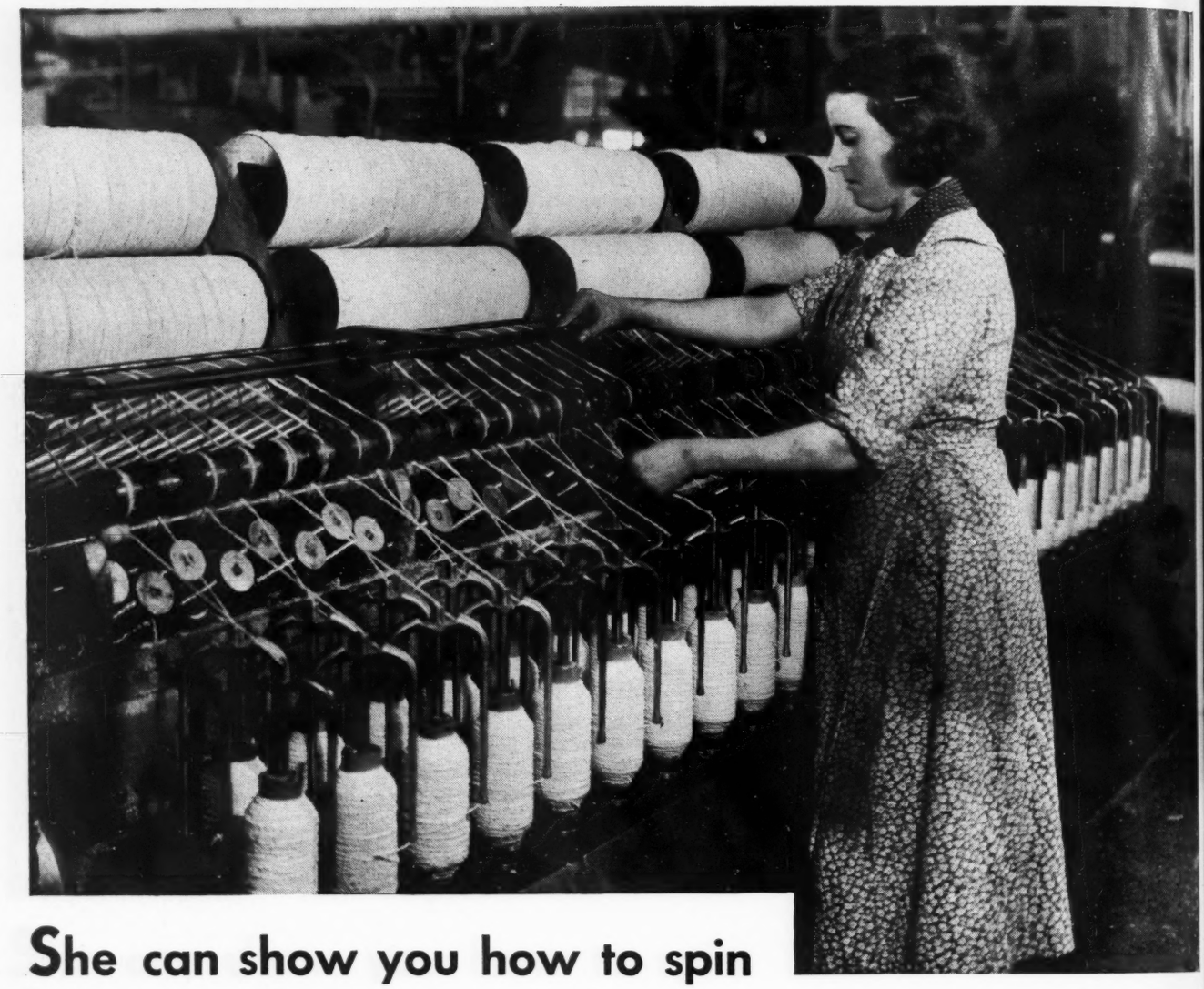
When the bomb bursts, the bricks burn

Hot Facts Shot Direct From The Burning Bricks

A detailed study of the cars and their performance in the Silver Jubilee 500-Mile International Sweepstakes at Indianapolis, with specifications of all cars entered in the race. A story written direct from the pits, especially for readers of Motor Age.

New Olds Automatic Transmission

A few short days ago, Oldsmobile announced its new automatic transmission, offered as optional equipment on the Olds eight. Here is a complete description of this new unit, fully illustrated and worth studying from beginning to end.



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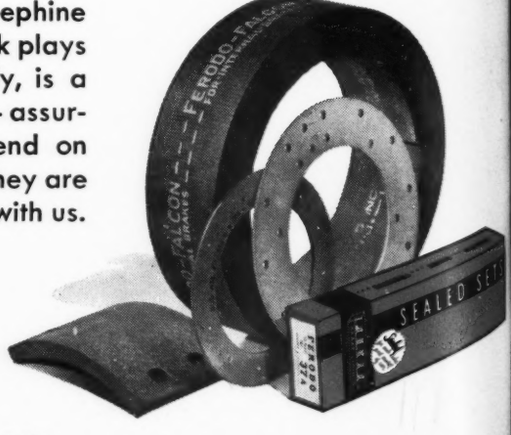

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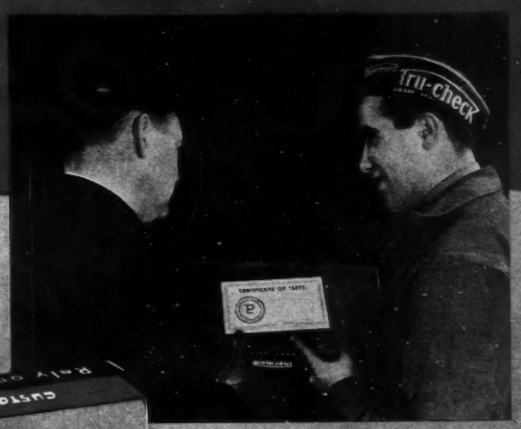

Thermoid

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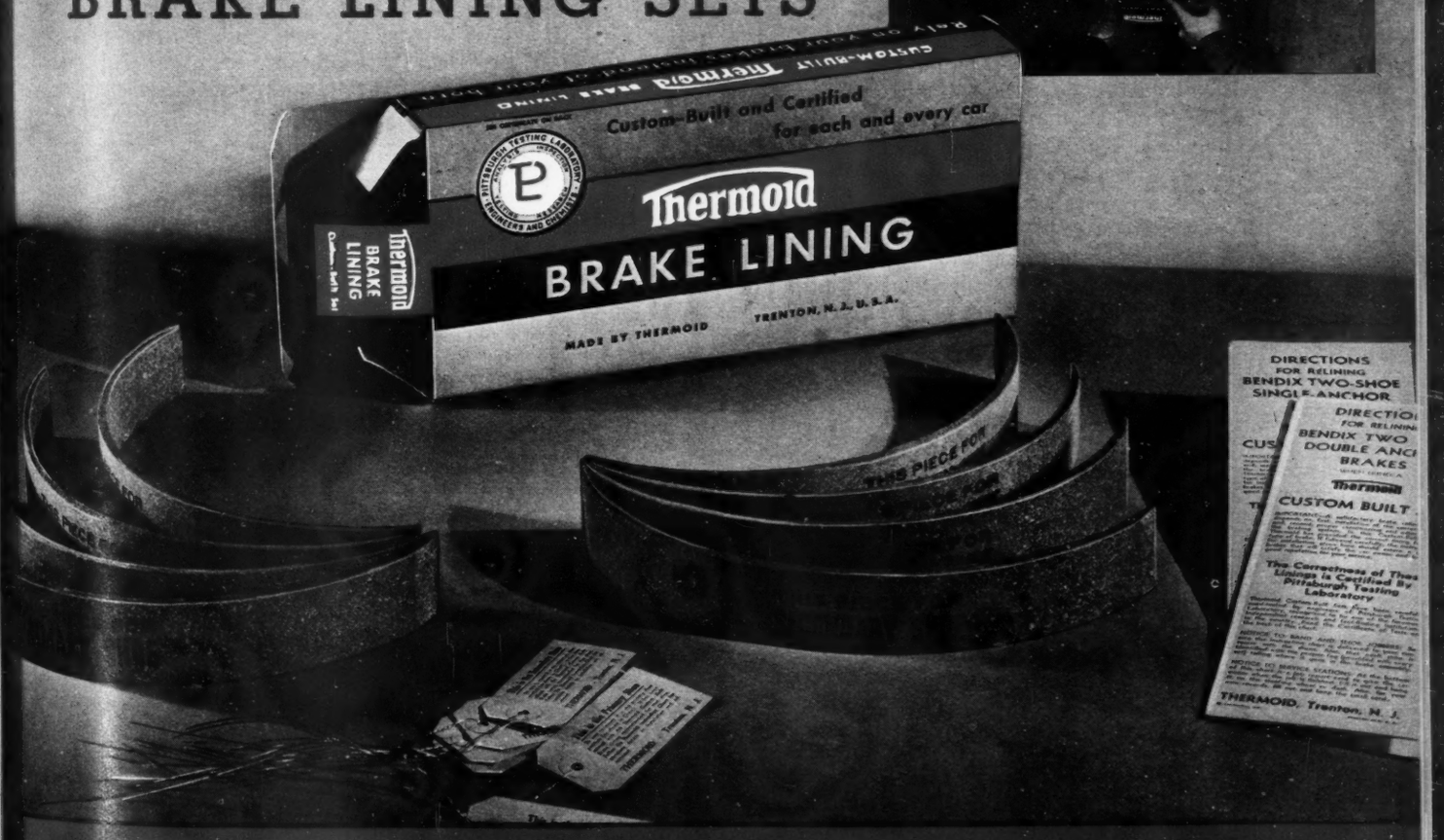
BRAKE LINING SETS



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MOTOR AGE

DEVOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

Subscriptions for Motor Age are accepted only from independent repair shops and their employees.

Vol. LVI, No. 7 June, 1937

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MOTOR AGE

JUNE 1937

SHOP TALK

Don't Gamble

To be successful in service business you can't afford to gamble with obsolete business methods. Car factories are emphasizing more than ever before the profit possibilities of the service dollar and are spending huge sums of money to educate their dealers on ways and means of increasing such profits. To keep in the game, independent shop operators must be constantly on the alert to find better and more profitable ways of doing business. Each issue of Motor Age has many good business pointers. If you have some special problem you want to talk over, write me a letter. I'll keep it confidential if that is your wish.

How Old is Old?

Well, I certainly earned my salary today, getting the answer to a query from J. Roland Mitchel who hails from Eastport, Maine. All Mitch wanted to know was what company made a 2⅞ by 4½ in. V-8, L head engine with two mains, Atwater-Kent ignition and aluminum crankcase. After I shoveled the dirt from the files I found the answer. Its a Regal, built in 1915.

Meier Fire

George Meier of Bedford Hills, N. Y., certainly had some tough luck. A fire burned out the whole works and now George is trying to get on somebody's payroll.

Bouquets and Brickbats

Bob Erny in Philadelphia, certainly likes Motor Age. In a recent letter he says "The wide scope Motor Age covers is a real asset to the man operating a shop and also to his men. An independent repairman can be thankful that he has someone like you and your staff to call on for consultation. Also the articles in Motor Age are taken from a practical viewpoint and not only theory."—Thanks Bob, for the orchids. They make up for the poison ivy I got from Bill Salsburgh of Altamont, N. Y. Bill says "please discontinue Motor Age, because I am very much dissatisfied as I find it a magazine with very little information and full of advertising."—Well, it's nice to know we have plenty of something, even if it is only advertising.

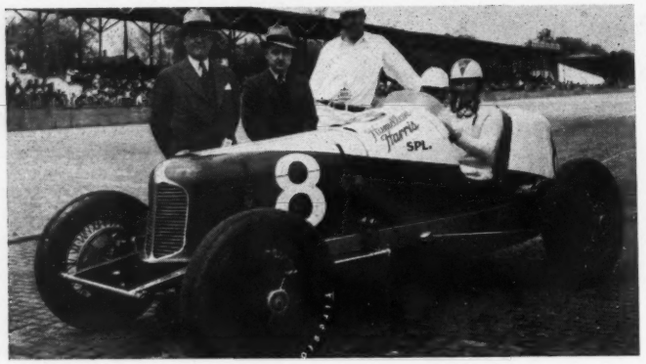
Repairmen Reap Reward

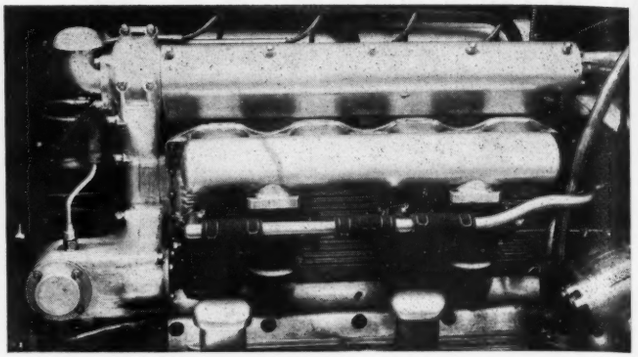
Permite has someting new in the way of a contest. It is open to repairmen only, so everyone starts from scratch, and you can win a Ford, Chevrolet or Plymouth two-door deluxe sedan or one of 6,442 other prizes. All you have to do is complete a sentence telling why you like Permite parts. All the dope is given on another page in this issue.

Neil's Note

A letter from Ed Neil of N. W. Ayer gave some interesting side lights on a fire which started because of a backfire. This threw a quantity of gasoline into the V between the cylinders. The gas did not drain off because of the accumulation of grease and dirt which plugged the drain hole. The gas and grease ignited and the fire was hot enough to break the glass bowl at the bottom of the vacuum tank, which added some more fuel to the fire. The car was practically a total loss. And the moral is be sure you keep the engine and chassis clean and free from grease. Modern type air cleaners on the carburetors also help.

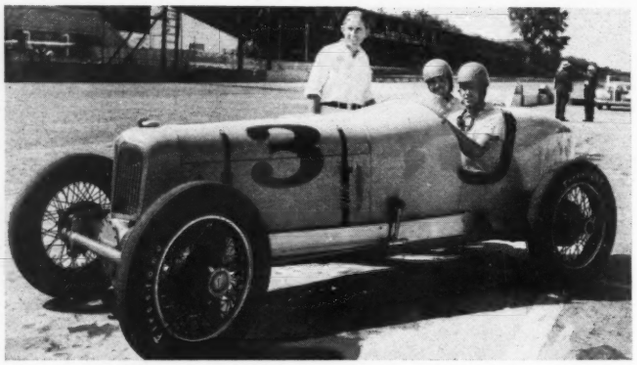
Bill Toboldt



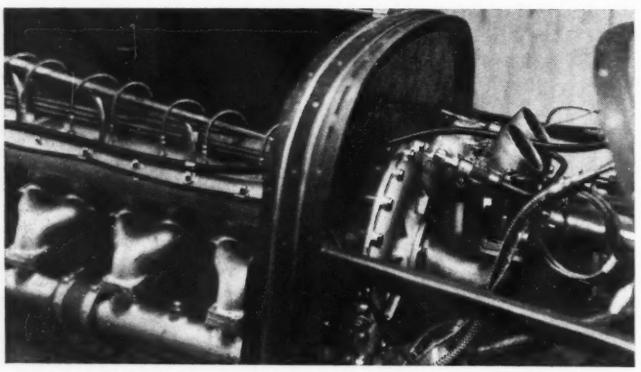


Hepburn who finished 2.16 seconds behind the leader used the same size and make of engine as Shaw. This is the same car that Meyer placed in first position last year

Shaw Wins Fastest "500" as Records Fall



Harry Hartz had Ted Horn pilot his 8 cylinder 2⅞ x 3½ in., 182 cu. in. front drive job. As usual the Hartz entry finished in the money, coming in third. Note the supercharger behind the dash on the engine view, below



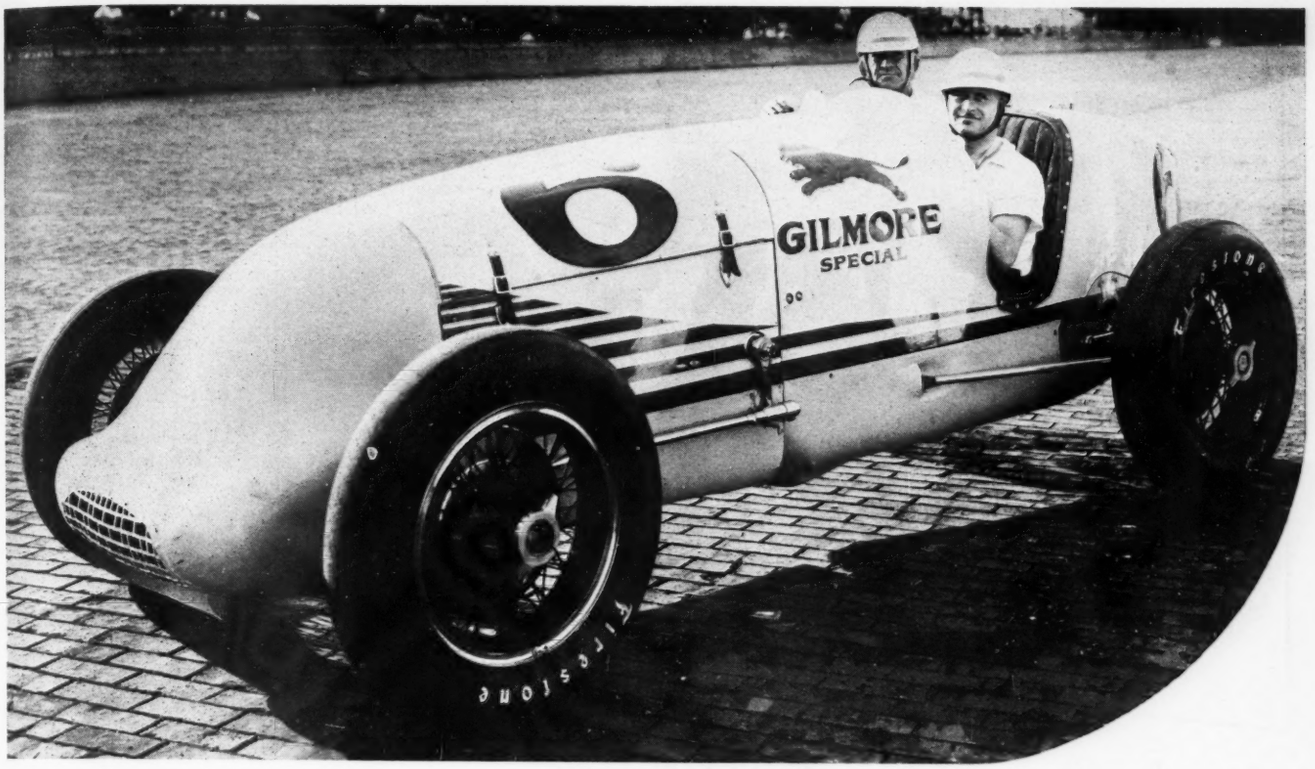
Fourth place had to satisfy Lou Meyer, this year. He elected to drive one of Mike Boyles jobs, having sold his car shortly before the race

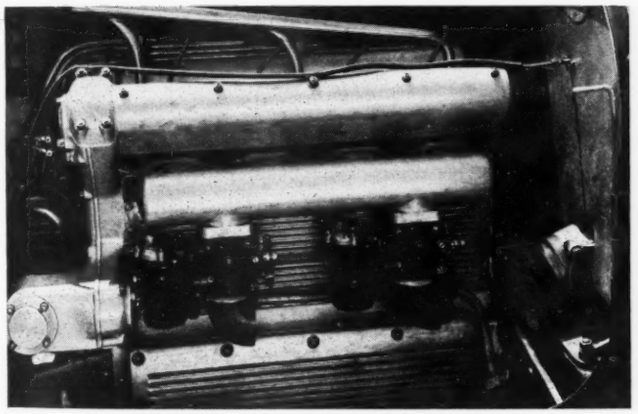
Victory at the Indianapolis Silver Jubilee sets new mark. Hepburn only 2.16 seconds behind leader

By BOB HANKINSON

DRIVING the fastest race ever seen on the Indianapolis track, Wilbur Shaw piloted his Offenhauser powered racing car across the finish line ahead of the pack of racing demons to win the coveted Borg-Warner trophy, and set a new record of an average speed of 113.580 miles per hour for 500 miles. Driving the entire distance without relief, and making only two pitstops for a total time-out of less than three minutes, Shaw has hung up a mark for the rest of the boys to shoot at that will keep them on their toes.

No less thrilling to watch was the performance of Ralph Hepburn, who crossed the line just 2.16 seconds behind Shaw to place second. Overcome by the heat at the 108th lap, Hepburn was forced to relinquish his seat to Bob Swanson until he recovered. Taking command again at the 167th lap he staged a brilliant come-back and rode Shaw's tail, lap after lap, but was unable to squeeze out that extra fraction of speed necessary to put him in first place. His average speed was 113.565 miles per hour. Just 0.015 miles per hour slower than Shaw's. Of the 33 cars that started the race, only 14 were running at the finish. Overheating, oil loss, clutch failures and burned out bearings took their toll of cars, leaving only those in the race that were mechanically fit to stand up under the terrific high speeds and high temperatures encountered dur-





Shaw's winning Gilmore Special was powered with a four cylinder, 4¼ x 4½ in., 255 cu. in. Offenhauser engine. No supercharger was used, carburetion being supplied by two updraft Winfield Carburetors

ing the 500-mile grind. Crankcase temperatures ran particularly high, in some cases well up to the 300 deg. mark. Oil consumption was particularly heavy as is always the case with high speed driving.

In spite of the fact that 25 quarts of oil were allowed for the race, several jobs ran into trouble through a shortage of oil. For the last 15 laps Shaw's oil pressure gage registered zero on the turns, barely picking up enough pressure on the straightaways to keep the bearings from burning out. It was a speed-record-breaking race from start to finish, the first four winners exceeding the average speed of 109.069 miles per hour set by Louis Meyer last year. Only one record did not fall and that was the average speed at the end of the 200-mile mark which was 114.526 miles per hour in 1936 and 114.181 miles per hour this year.

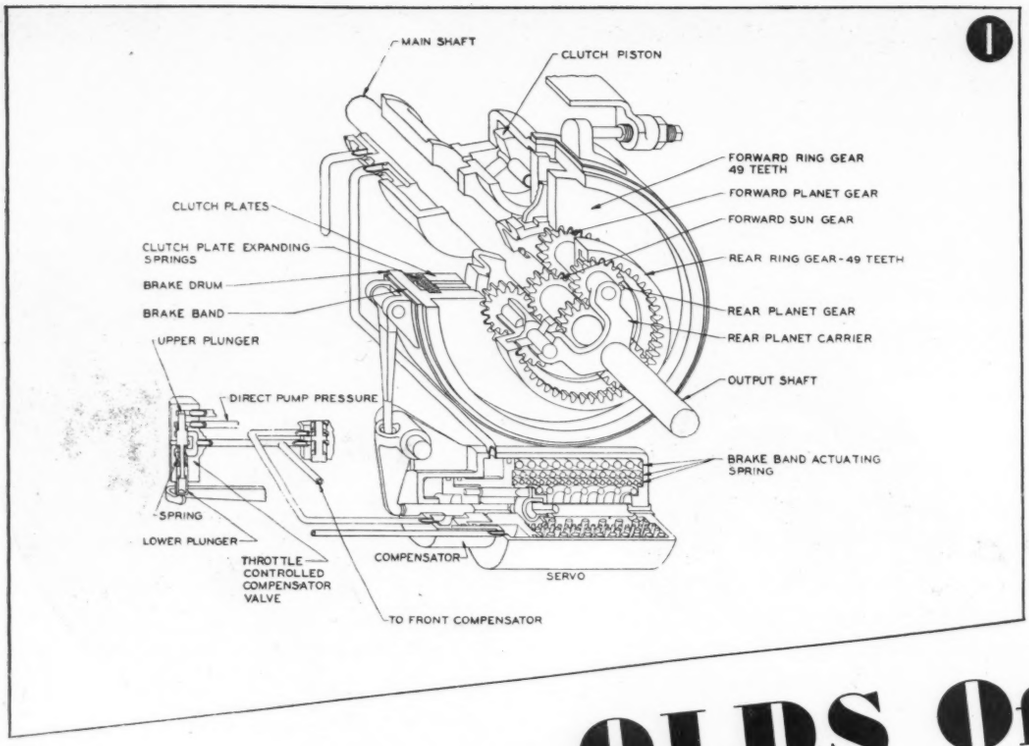
Wilbur Shaw's winning car used Burd piston rings, Packard ignition cable, Firestone tires, two Winfield carburetors, Champion spark plugs, Bosch magneto and starter, Gabriel shock absorbers, Gilmore gasoline and oil and New Departure bearings.

At the end of 50 miles Jimmy Snyder led the field with an average speed of 117.947 miles per hour. His job, which made an unofficial practice lap at better than 130 miles per hour and also set the highest qualifying speed of 125.287 miles per hour, was powered by a new Sparks engine of 337 cu. in. displacement. It is equipped with a single horizontal type Winfield carburetor and a centrifugal type supercharger mounted at the rear of the engine.

With the requirement that cars use only a standard grade of gas instead of special racing fuel, it was necessary to lower the compression ratios considerably. This was accomplished in the main by the use of a piston with a concave head. Compression ratios ranged from 7.25 to 1 up to 8 to 1 in the majority of cases, with one job reported as being about 9 to 1.

The Maserati driven by Babe Stapp and the Alfa Romeo driven by Rex Mays presented quite serious problems to the mechanics. Both are of foreign make and considerable work had to be done on them to meet the new fuel requirements. Compression ratios had to be changed as these jobs were built to run on alcohol. Valve timing had to be changed also and when these jobs were worked over to conform to our regula-

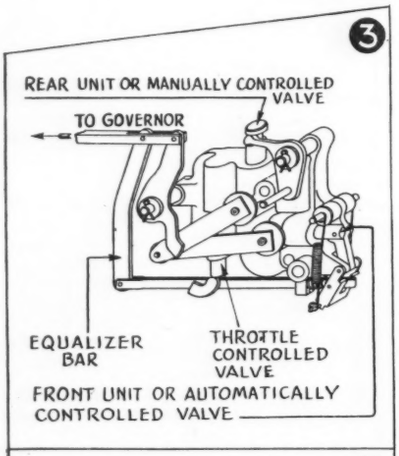
(*Continued on page* 30)

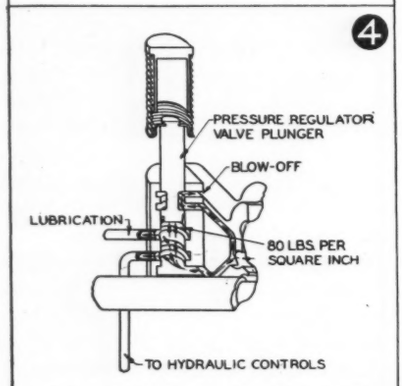


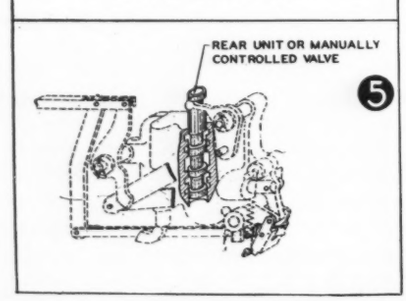
1. **Rear planetary unit**
2. **Complete automatic transmission**
3. **The oil pumps consist of three units**
4. **Pump discharge flows to the pressure regulator valve where it is distributed to the oil control unit and the lubricating system**
5. **Details of the rear oil unit which affects the operation of the rear planetary unit only**

OLDS Offering

Details on the new automatic unit offered



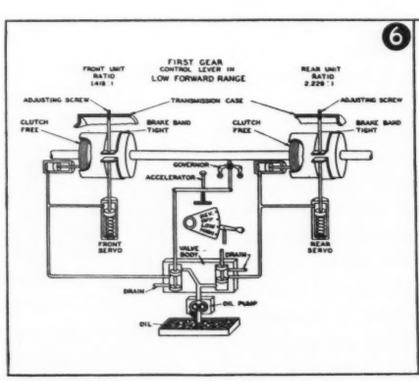


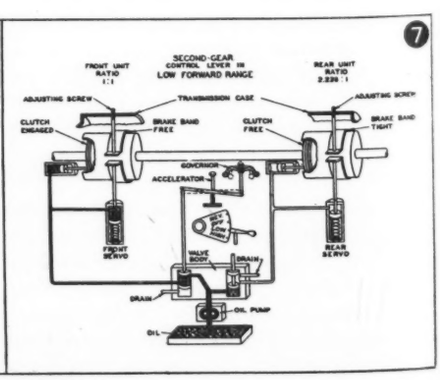


OLDSMOBILE'S new automatic transmission offered as optional equipment at an added cost of $80 on the Olds eight only, represents a radical departure from standard gear set design. The unit, with the exception of the control placed under the steering wheel is completely self contained and replaces the conventional transmission. Briefly, the new mechanism employs oil pressure to control the operation of two planetary units which, in combination, provide the different gear ratios.

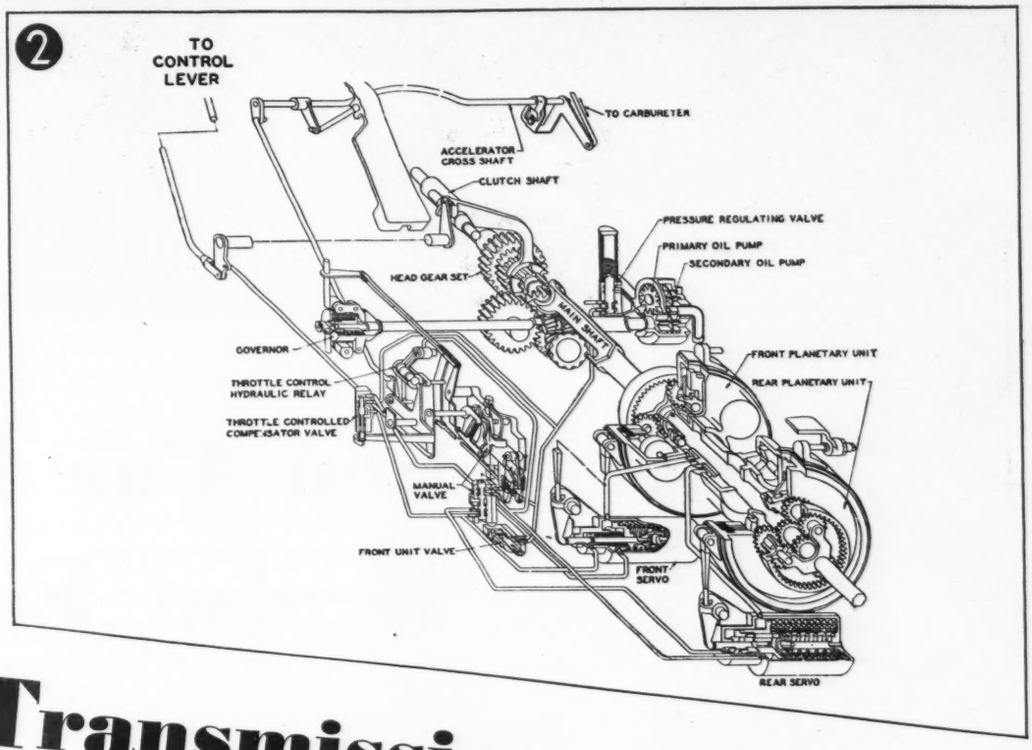
Among the advantages claimed for the design are: Automatic gear shifting, minimum clutch operation, greater fuel and oil economy, reduction in engine revolutions providing longer engine life, greater acceleration, increased flexibility at all speeds and elimination of shifting lever from front compartment floor. The unit is of the four forward speed type providing ratios of 3.55 to 1, 5.03 to 1, 7.91 to 1 and 11.22 to 1 for fourth, third, secod and first, respectively. Fourth speed is, of course, direct and the 3.55 ratio represents the rear axle reduction.

In the new automatic transmission there are two forward driving ranges, low and high, together with the usual reverse. The "low" range, which includes





6. In first gear both planetary units are operating as reduction units
7. In second gear only the rear planetary unit operates as a reduction unit
8. In third gear only the front planetary unit operates as a reduction unit
9. In reverse, both planetary units are operating as reduction units
11. Head gear set
12. Front planetary unit



New Transmission

optionally on the eight cylinder models only

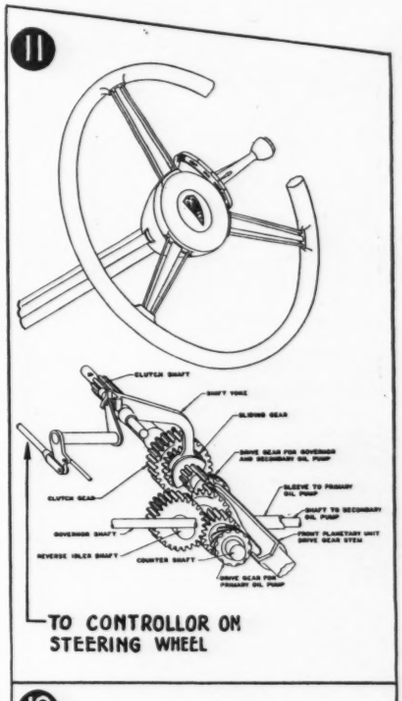
By BILL TOBOLDT

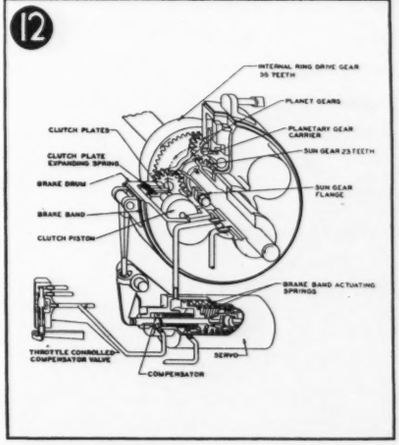
first and second gear, is provided for starting with a cold engine or on a hill or when greater than normal acceleration is desired. The "high" range includes first, third and fourth, or direct gear, and its use results in improved economy and higher top speed, etc.

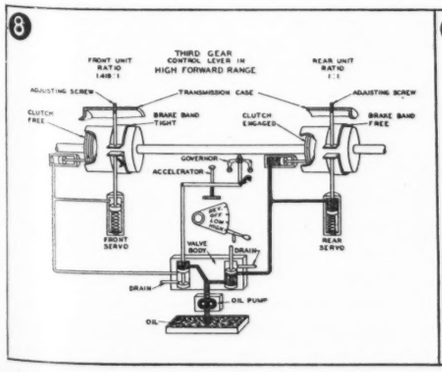
To drive the car the clutch is disengaged, the engine started, the shift lever under the steering wheel is moved from neutral to "low" range forward position. The clutch is then engaged in the normal manner and the car will move forward. Then, as the driver continues to accelerate, the transmission will automatically shift to second. If the car is accelerated at part throttle, the shift will occur at about 10 m.p.h. If the throttle is opened wide, the shift will occur at about 22 m.p.h. The car will continue to operate in second gear unless the car speed drops below 4 m.p.h. in which case the transmission will automatically shift down to the first gear.

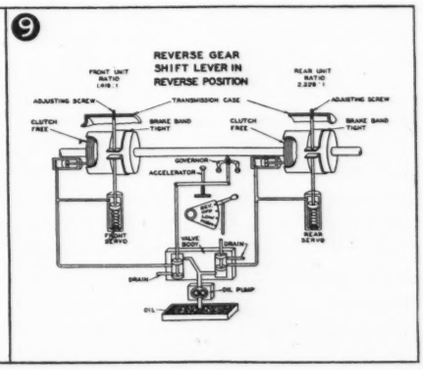
To shift from low range to high range, it is only necessary to move the shift lever to the high range position. No disengagement of the clutch nor special movement of the accelerator is required to make this shift. With the shift lever in the high position and operating

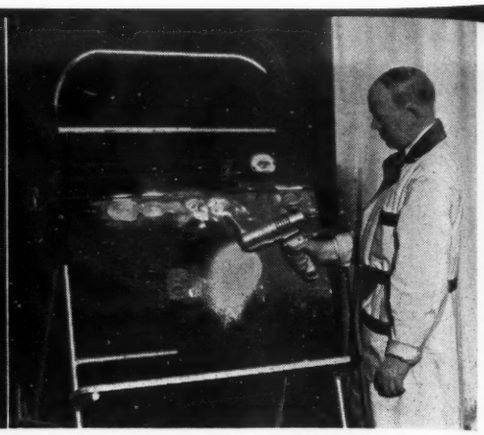
(Continued on page 60)

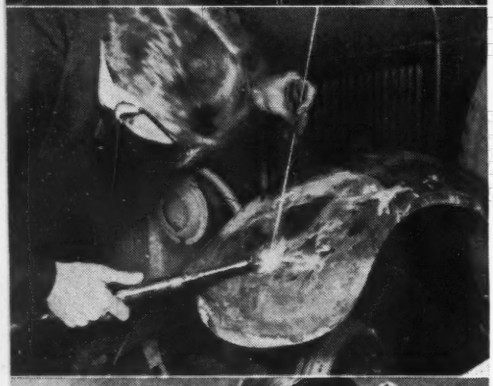


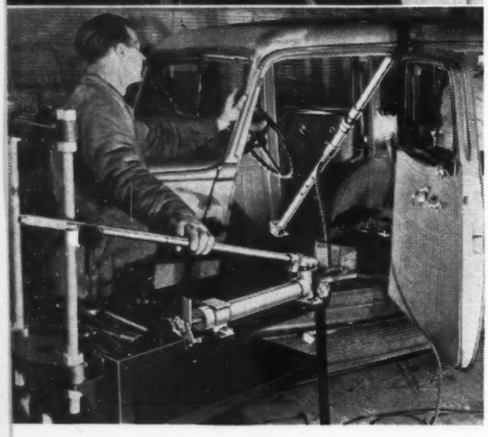












When Car Bodies Bruise Easily

Bumps and bruises and tender fenders are plentiful these days. Here's how you can cure them easily and profitably

WITH steadily increasing car registration and attendant traffic hazards, the importance of straightening fenders and body panels has become one of the leading profit makers of automotive service stations.

To do such work profitably and also meet the demands of customers for quality workmanship requires modern equipment.

Only a few years ago any shop that had a few dolly blocks and a ding hammer, a file, soldering iron and paint brushes had all the equipment needed to iron out the wrinkles from any fender.

Today the dolly blocks and ding hammer are just as necessary but have become essentially roughing out tools. Other tools and equipment have been developed to straighten sheet metal work quicker and better than the old hand methods.

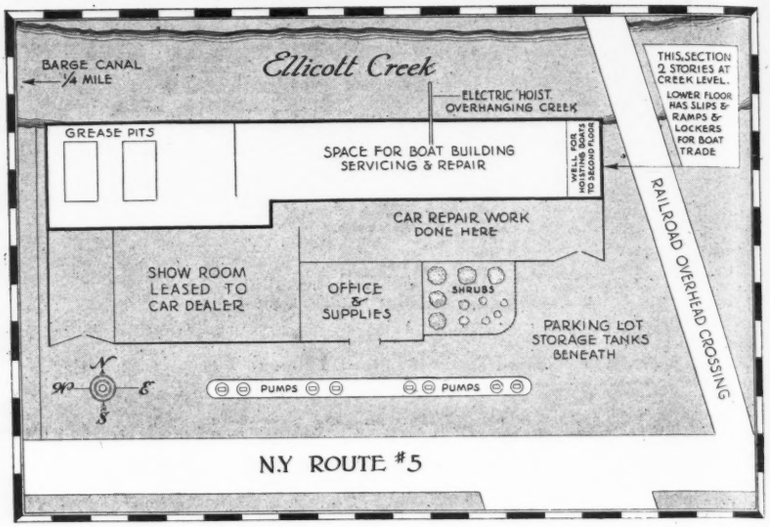
Electrical ding hammers and sanders have been developed. Solder guns for spraying solder so that dents can be filled without removing upholstery, now shorten the time required to do such jobs. Special portable hydraulic jacks and mechanical jacks have been designed to speed up the straightening of wrecks. It pays to salvage the modern fender and body panel since their cost has increased. To do this welding equipment is generally required.

Paint brushes are, of course, a thing of the past, having been superseded by spray guns. Lacquers and other quick drying refinishing materials used in spray guns make it possible to duplicate factory finishes. Matching colors has been simplified by the manufacturers of refinishing material by supplying colors duplicating those used by the car factories. The latter have also assisted by stamping on the car the code number of the color used. In this connection, a table giving these color code numbers for each car is given elsewhere in this issue.

Fender and body work is receiving greater attention by both car dealer shops and independent shops because this type of work not only is profitable but is also increasing, while some other types of major repair work are decreasing.

One thing is sure and that is while designing engineers may improve cars so that major repairs will continue to decrease, they can't change human nature. And, as long as that is so—there will be plenty of wrecks for the shops that go after such business.

"I was rounding a few curves and went off the road"

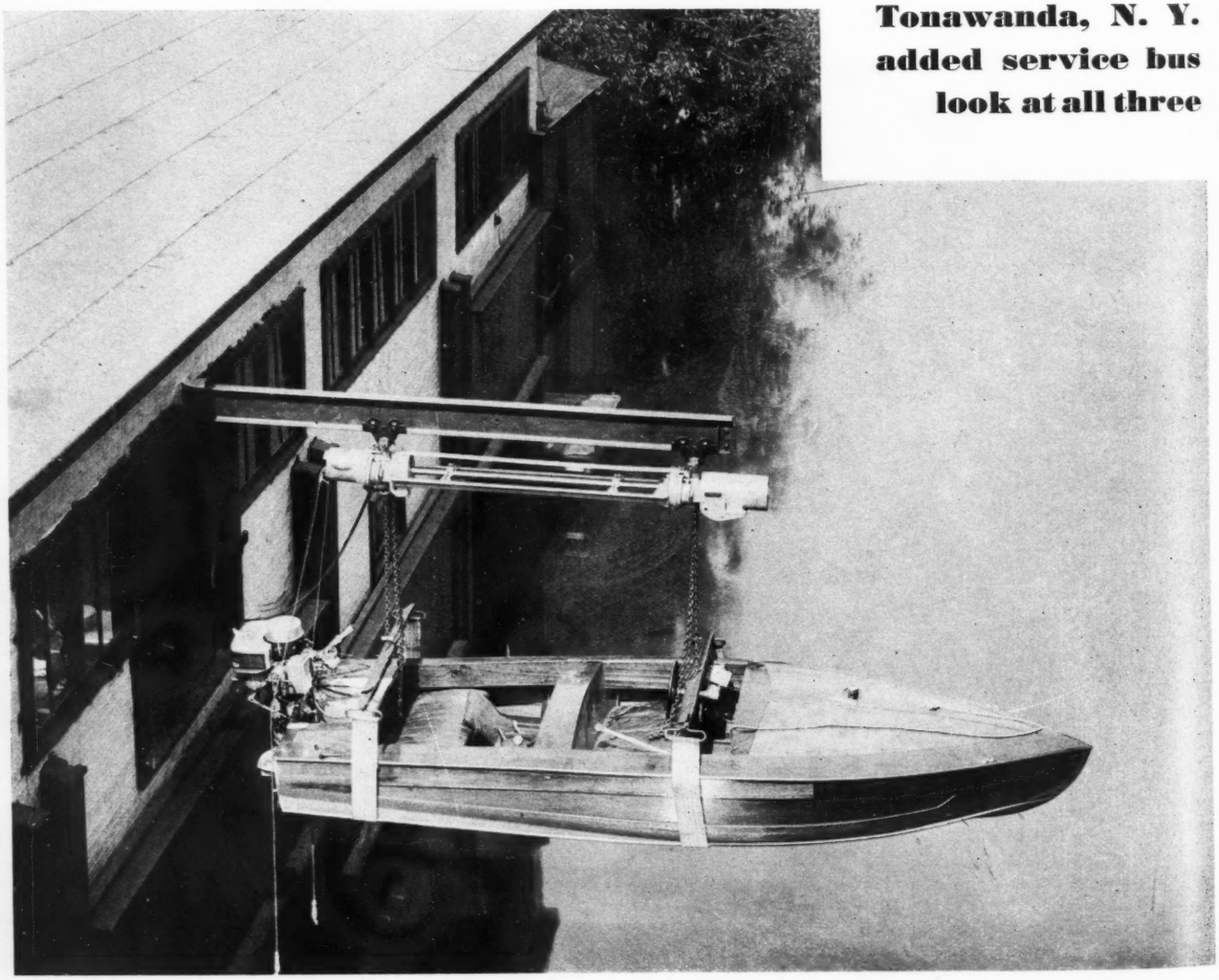

BARGE CANAL
¼ MILE
Ellicott Creek
ELECTRIC HOIST OVERHANGING CREEK
THIS SECTION 2 STORIES AT CREEK LEVEL. LOWER FLOOR HAS SLIPS & RAMPS & LOCKERS FOR BOAT TRADE
GREASE PITS
SPACE FOR BOAT BUILDING SERVICING & REPAIR
WELL FOR HOISTING BOATS TO SECOND FLOOR
RAILROAD OVERHEAD CROSSING
CAR REPAIR WORK DONE HERE
SHOW ROOM LEASED TO CAR DEALER
OFFICE & SUPPLIES
SHRUBS
PARKING LOT STORAGE TANKS BENEATH
PUMPS
PUMPS
N.Y. ROUTE #5

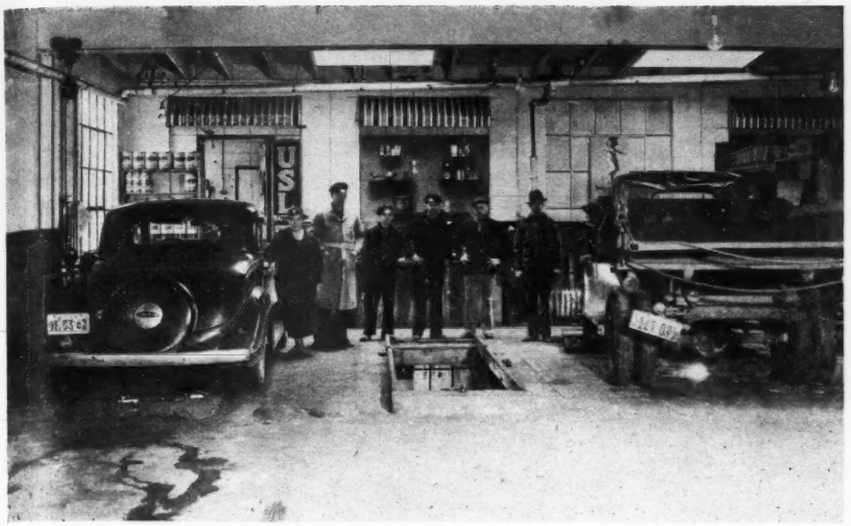
Struebing Covers

Tonawanda, N. Y. added service bus look at all three

EDWARD STRUEBING, Tonawanda, N. Y., repair shop operator, is in a service business and he knows it. In fact, he has discovered a three-way profit opportunity as the result of being able to sell his service to three distinct classes of trade . . . car owners, truck operators and owners of motor boats and other watercraft. Just recently he has become agent for a well-known line of house trailers which may well prove to be a fourth important money maker.

It was about 15 years ago that Mr. Struebing obtained a small service garage at his present location from a man who was heartily glad to be rid of it. There was not even a gas pump on the place. But the location is on a street which is parallel to Elli-





by ***LLOYD GRAHAM***

Struebing Service Station extends 237 feet along the highway with a 172 foot frontage along the Ellicott Creek . . . and in this manner his service doors are open to owners of watercraft as well as cars and trucks

the Waterfront

repairman greases the ways for iness and finds that it pays to . . . cars, trucks and boats

cott Creek and is a part of N. Y. Route 5. It is, in effect, a center for users of boats with outboard motors, and for small inboard boats.

Mr. Struebing built the garage back to the water's edge and began to feature the service and storage of motor boats as an added feature to the automobile and truck repair business he had already developed. Additions and improvements were made over a period of years.

Today, the Struebing station includes a frontage of 172 ft. on the creek and 237 ft. on Young Street.

The gas sales at Struebing's average about 1,000 gallons daily throughout the year. He has eight pumps and carries five name brands of gas.

The battery and oil service is located in the basement, the floor of which is only slightly above the high-water mark of the creek. On the main floor are two pits for greasing, but the greasing is done from elevated platforms on the basement floor. There are here also facilities for the servicing of batteries and tires.

Edward Struebing

The present layout on the creek side of the garage has two levels for the boat business. The creek-level portion of the building has nine slips for housing motorboats up to 32 feet. long. Each is thus sheltered in the main building, and the entrance of each slip is protected by a door which lowers to within 6 inches of the water. The owner of each boat so housed has the use of a locker.

Next to the slips on the west end of the basement is a ramp for small outboard motor boats. This is 37 feet wide and slopes down into the water outside the building so that the small boats may be hauled up the ramp through either of three openings which are 6 feet wide and 5 feet high. Doors lift up from these openings. Between the ramp and the series of slips there is a platform where are located two gasoline pumps, the upper halves of the pumps being outside the building and the lower halves within.

Electric hoists and cradles with large casters are used for handling the boats, so that neither employees nor boat owners have to waste any energy hauling boats around. The building is of steel and brick construction with the floor above the slips of half-inch steel plates. At the east end of the main floor above the slips is a cut in the floor, so that boats run into the slip below may be hoisted to the main floor for storage or repair. Under the roof is a track, so that the electric hoist can place a boat anywhere on this floor. There are also hoists over the slips so that the boats may be easily brought out of the water when winter weather begins.

There is also a smaller electric hoist operating from a steel beam extending over the water for picking small inboard and outboard motor boats out of the water and putting them down in cradles on the main floor.

Outboard boats, 16 ft. or under in length, are stored for $5 per month for the five summer months and $20 for the seven winter months of dead storage. Inboard and outboard motor boats longer than 16 ft. are stored for $15 per month during the five summer months and $5 per foot-length of the boat during the winter. These charges include taking the boat out of the water, cleaning it up, storing the battery for the winter, and so on.

Generally speaking, Mr. Struebing's workmen do any work that is necessary on these boats and this includes mechanical overhaul and repairs as well as work on hulls. Whether the work is on boat or motor, the boat owners pay $1.50 per hour for labor. Such work may include anything at all con-

(*Continued on page* 72)

The ABC's of Shop Book

THE Cash Book is so called because in it is recorded all cash received and cash paid out and invoices for all expenses in the running of a business.

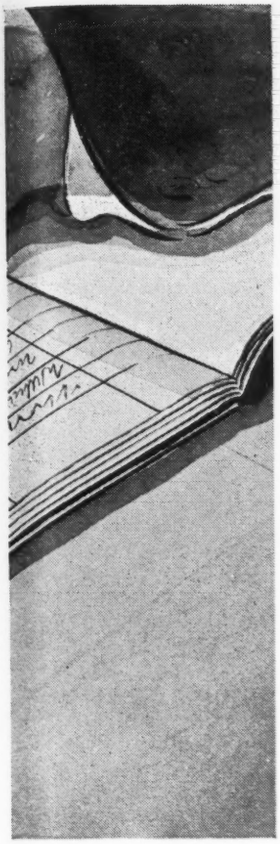
This book itself can be obtained from any stationery store in 150 or 300 pages. As approximately six pages will be used for each month, it is a matter of choice as to which size to get.

Below is a sample of the ruling in this book and how to head up each column. The left hand page is the proper one to begin with as the right hand page is used in conjunction and you will note from the headings they all tie in together.

Before making any entries in this book, remember that for every debit entry there must be an offsetting credit entry made. This is what is known as double entry bookkeeping and gets the name from the fact that double entries are made for everything and one balances the other.

The first entry in this book is made on the left hand page and is taken from the Cash Register tape, which you have already entered in the Sales Book. Start with the first day of the month and keep all entries in order. Look over the tape and see if there was any money rung up that was received to pay a charge account, if so, it would be rung up with "Rc" along side the amount and also the the customers name. Enter the customers name in the name space and the date of the slip in the date column. Then the amount received in the second column

	Date 1937		Accts. Receivable DR.	Accts. Receivable CR.	Cash Sales CR.	Cash DR.	Cash CR.	
1	Jan 1	John Doe		10 50		10 50		1
2		Mary Jones		9 –		9 –		2
3		Cash Sales			14 75	14 75		3
4								4
5								5
6								6



which is headed "Accounts Receivable" credit. Also enter the same amount in the column headed "Cash" debit. You will note that you have a debit and credit entry. If there is more than one customer's name on the tape, enter all as above described. Then in the name space write "Cash Sales" and enter the figure on the tape that you have already entered in the Sales Book, in the fourth column headed "Cash Sales" credit and also in the Cash debit column. This last figure you have entered should be the same amount as you entered in the Sales Book for the same day. Look back to the Sales Book and check the figure to see if you have the correct figure. If the register tape does not contain any customer's name as having paid an account, you will have only one entry and that will be the last described, namely Cash Sales and the amount in the two columns.

keeping: Part 2

The second in a series of articles describing a simple but complete bookkeeping set-up for garages and repair shops. This article describes: The Cash Book

By H. W. HANKINSON

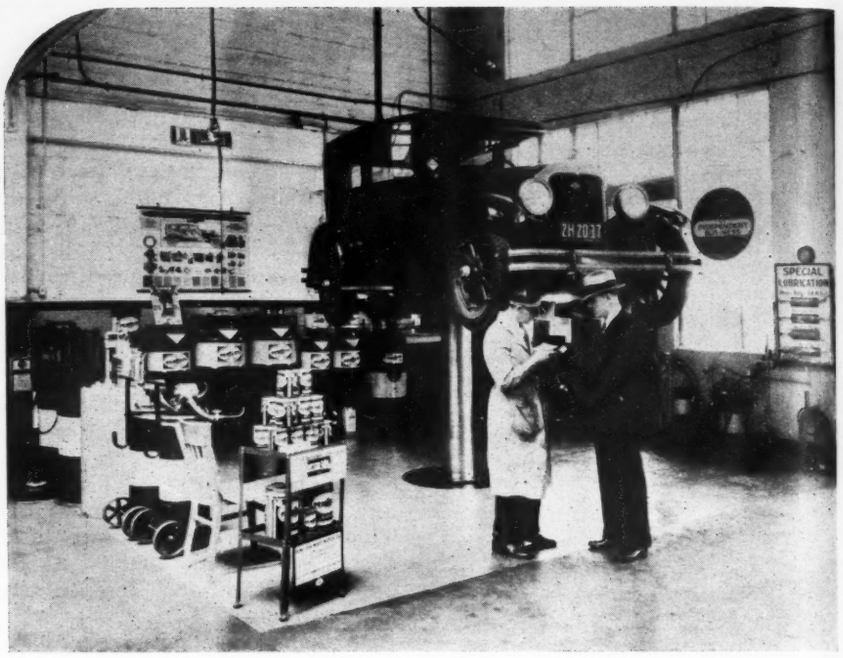
All entries made in the Cash debit column signify that that amount of cash has been received and deposits to the bank should correspond with the total of that column. It is well to deposit money every day or so and not keep too much on hand. To prepare the deposit, first make a total in small pencil figures under the last entry in the Cash debit column, including all entries. Then on a deposit slip which is furnished by your bank, list the checks and bills and change. Add this list and the total should be the same as in the book. If there is a difference, you must have spent some money and not replaced it. Your deposit must agree with the total in the cash book in order to keep the cash in balance with the bank and know just how much business you are doing. So remember this, as it is very important. The column headed "Cash Sales" credit, should also be checked with the entries already made in the Sales Book and should be identical. The Sales Book is simply a detail of the Cash Book entry in this particular column. See sample entry of Cash Register tape on page one.

All entries you have made in the credit column under the heading "Accounts Receivable" are for money received on charge accounts. These items should be posted or transferred to the proper account in the Accounts Receivable Ledger which you have already made. There is a page made out for each customer who has charged and is now paying. When you entered the charge, it was written on the debit or left side, now it is being paid and should be entered on the credit or right side. If the amounts

(*Continued on page* 57)

	Date 1937		Accts. Payable DR.	Accts. Payable CR.	Payroll Expense DR.	Payroll Expense DR.	General Ledger DR.	General Ledger CR.	
1	Jan 5	Motor Equip, Inc.		17—	316	17—			1
2	10	General Assembly Co.					401 150—	601 150—	2
3									3
4									4
5									5
6									6

THESE are practical merchandising ideas that have been used by maintenance men — just like yourself. Workable ideas gathered from here, there and everywhere and presented for practical application to your business. Use them and write us your experience for publication herein.



BEFORE

SELLING SERVICE

By Frank P. Tighe

Shop Feeds On Lube and Tune-up Department Contacts

COMBINING motor tune with lubrication service in one department, an idea recently tried out in the Earl E. Robbins independent repair shop in San Francisco, California, has proved beneficial in building up extra revenue.

Under this arrangement Robbins was able to make a most impressive display with only such equipment as he could afford to install, with the additional advantage that customers bringing in their cars for greasing and oil can be easily contacted for motor tunes. In fact, since the combination department was created, approximately 50 per cent of lubrication customers have been sold also on motor tunes. Shown on these pages are "Before" and "After" pictures of this combined department.

The motor tunes, as well as the lubrication service, have been regular feeders for profitable repair jobs. Some of the jobs thus contacted have run into $65, and even $100, according to Mr. Robbins, and have resulted also in the sale of carburetors, spark plugs and other profitable items.

The motor testing equipment has been worked in with lubrication and greasing equipment by adopting a uniform color scheme, red, yellow and white. Space in the lubrication department was doubled to include the motor testing equipment, the latter being located left of the greasing rack. An important feature of the new setup is that the same set of records is kept for both lubrication and motor tune operations, these serving as the basis of a follow-up to sell repair service. The records are kept on a desk placed in the center of the department, making them conveniently accessible to the lubrication man and the motor tune operator.

The advantages of the new arrangement are reciprocal, according to Mr. Robbins, as owners bringing in their cars for motor tunes are readily sold on the lubrication service, and vice versa. Customers waiting for their cars to be greased and oiled spend their time observing the analyzer equipment, consisting of motor analyzer, fuel analyzer and cyncographer.

Eight Reasons Why

THE successful operation of a service station is largely a matter of good management, according to M. N. Zimmerman, owner of Zimmerman's Service Station, Reading, Pa. He lists eight points covering his policy:

1. Proper training of service men to give 100 per cent satisfaction to customers. They must not only know how to do the work assigned to them but must be courteous to customers.

2. Personal contact selling outside the station to develop new accounts. Visit all business and professional people that may be classed as desirable credit risks and sell them superservice.

3. A safe credit policy that provides for credit checking through the local credit bureau and the prompt collection of accounts when due instead of extending credit terms over a longer period. Zimmerman's business is 40 per cent credit. Credit losses in past year totaled $36.

4. Owner must not try to run business by absentee management, but must be on job at all times. Zimmerman works longer per day—14 hours —than any employee.

5. Pay employees what they are worth. Chiseling on wages discourages cooperation of help and good workers don't hunt for a cheap employer. Give cooperation and expect it. Know what employees do after working hours. If they go playboy and live beyond their income, get rid of them.

6. Have an accounting system that

AFTER

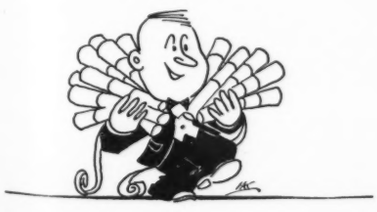
shows operations of each department —sales and profits—from day to day. You can't succeed by guessing that you've made a profit. It's your business to know and there's no excuse for not knowing.

7. Avoid price concessions. Cut price work takes lots of time and brings no profit. Besides you will soon find all your men doing cut-rate work while the profitable customer has to wait for service.

8. Don't dabble with cheap merchandise. Sell only first quality supplies that can be guaranteed and that yield a profit. The price shopper isn't a profitable customer. Let him go to the cut-rate store where he will be gypped properly, which is what he asks for anyhow, Mr. Zimmerman says.

Course In Window Decorating

DENNISON MFG. CO., Framingham, Mass., has prepared a correspondence course in window decorating available at a moderate cost.



Factory announcement states that this is a complete course. The five lessons cover almost every subject connected with the window display field. Besides the interesting text, there are outline windows to fill in to indicate the arrangement and color scheme that the student has learned.

Each lesson will be graded by Dennison's teachers and a progress card sent to indicate whether or not the student's work has been satisfactory.

A special offer on this course is being made. Single lessons can be had for only 25c plus three of the coupons from the back of the "Very Best" Dennison crepe packet.

Steering Wheel Tags Before and After

A SMALL change in the "reminder form" in use at Seattle's Central Tire & Service Co. has contributed to the steady volume increase which this service garage has been enjoying during the past year.

"We find," summarizes F. B. Taylor, garage manager, "that customers react to a reminder which includes as much handwriting as possible—does more than merely check a needed service by telling them WHY as well as WHAT!"

To do this, the form was changed to include nine lines of information space, instead of the former three lines. Still, just an inch was added to the length of the form, and nothing to the width, because the departmental mention was eliminated, also some advertising copy covering service, but greatest attention is focused on the specific data concerning the needs of HIS automobile. The one form is used in all 21 service departments.

For instance, instead of checking a printed name, or even writing a warning to the effect that "your wheels need repacking," this service garage now warns in this type of handwritten sales message: "Both the front wheels need bearing repacks. This work should be done every 5000 miles." Then follows a notation as to the price for the suggested work, and the service man to see.

BEFORE

COMPLETE
LUBRICATION
with
MOTO-SWAY MACHINE
Lubricates Under Actual Driving Conditions

Your car needs
wheel repacking

This work can be done the next time you are in while shopping, at work or on business.

More people each day are taking advantage of the Complete Service we offer.

Did you ever before consider—
The Convenience
The Responsibility
The Guarantee

Seven Months To Pay
ALL AT NO EXTRA COST

OFFERED BY
CENTRAL TIRE & SERVICE CO.
6TH AND OLIVE
EL. 3636 EL. 3032

AFTER

A FRIENDLY WARNING
By Seattle's Largest
Complete Auto Service
17 floors - - 6 devoted to Service

Both the front wheels need bearing repacks—
(This work should be done every 5,000 miles)

Get our price before buying $1.00 complete
See Mr. Elke

21 Complete Departments

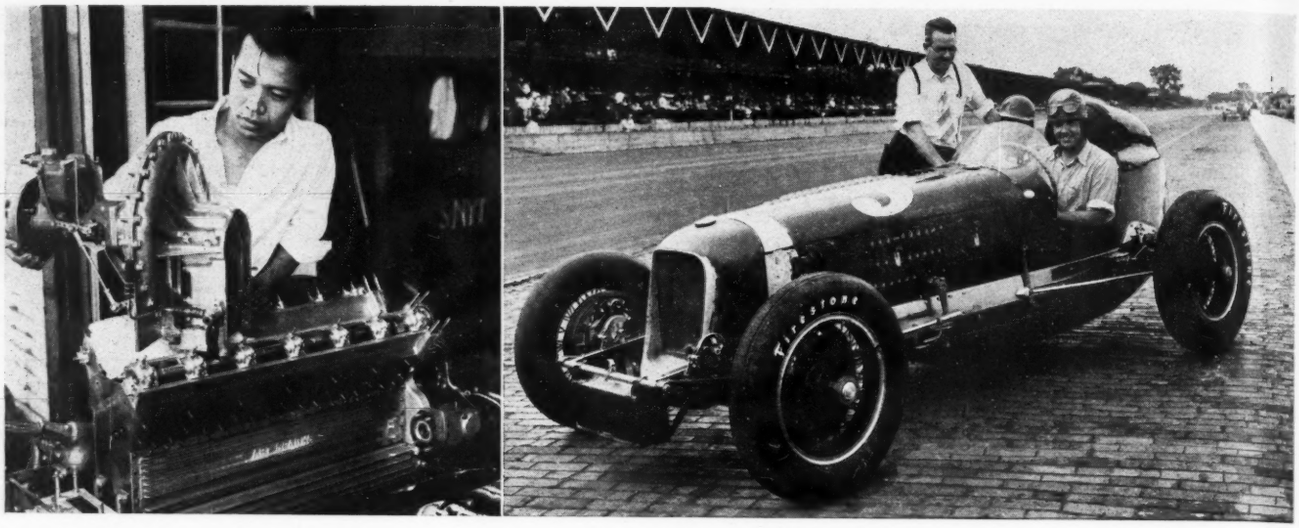
TERMS
6 MONTHS TO PAY. NOTHING DOWN
CASH OR OPEN ACCOUNT

This work can be done the next time you are in while shopping, at work or on business.

More people each day are taking advantage of the Complete Service we offer.

CENTRAL TIRE & SERVICE CO
6TH AND OLIVE
EL. 3636 EL. 3636

GUARANTEED WORK



The fastest time (130 m.p.h.) ever made over the Indianapolis bricks was made by Jimmy Snyder with a 6 cylinder 337 cu. in. engine designed by Sparks. He also made the fastest qualifying speed of 125.287 m.p.h. Tak Harishima, Jimmy's mechanic is shown holding the supercharger. Transmission trouble in the 28th lap prevented him from finishing

(Continued from page 19)

tions they proved to be not as fast as the Miller or Offenhauser engines.

Of particular interest mechanically was the Sparks Special engine in Jimmy Snyder's car, the new Brisko six-cylinder engine, the Voelker 12-cylinder job, the McDowell engine used in the Lucky Teeter Special, the Packard 120 of Snowberger's and the rear engined job built by Lee Oldfield.

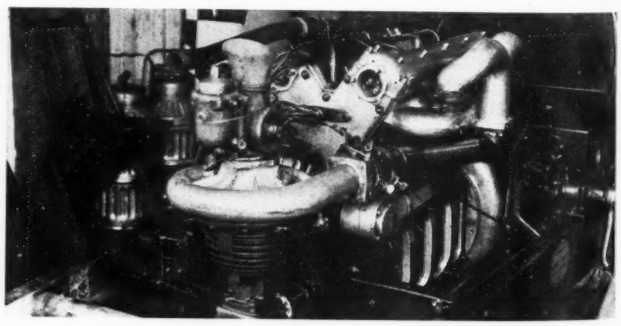
The Sparks engine has already been mentioned. The Brisko job is also a six with over-head camshafts and an aluminum block with steel sleeves. The introduction of these six cylinder engines may indicate a trend away from the eight. The Voelker V-12 did not qualify due to lack of time to work out some of the bugs, chief of which was carburetion.

One unusual feature of the Voelker engine is the articulated connecting rods and the practice of using needle bearings in the lower and upper ends of the rod. The Packard application seems to be a standard engine with, of course, a special head and other changes to hop it up to the racing engine class.

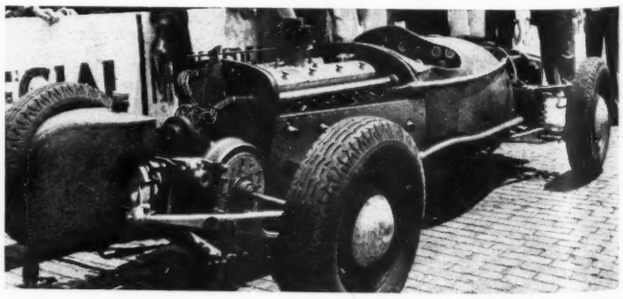
The McDowell is very similar to the Miller in appearance and is a splendid example of the fine construction features that go into the making of a racing engine. While the rear-engined Oldfield job was not finished in time to qualify, there is little doubt that its design embodies many desirable features. It is powered by a V-16 Marmon engine and should be plenty fast, and is independently sprung on all four wheels, the front suspension being similar to that used on Packard passenger cars. We may expect to see and hear more of this job as it is expected to be entered in the Roosevelt race, July 3.

Champion spark plugs are still the choice of the great majority of drivers although it will be noted that the Miller Hartz job driven in 3rd place by Ted Horn was equipped with Bowes plugs. New Departure bearings are used almost exclusively, as are Bosch magnetoes and Packard cable. Burd rings are found in the winning Wilbur Shaw job. Brakes are still pretty well divided between mechanical and hydraulic operation. Firestone tires were used 100 per cent and the high speeds combined with the rock asphalt newly laid on the turns of the track caused unusual tire wear. A total of 70 tire changes was made during the race.

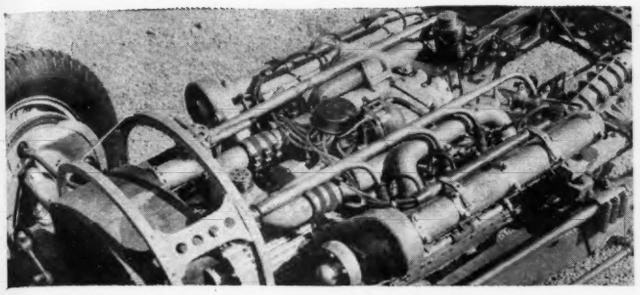
The Alfa Romeo, driven by Rex Mays overheated so badly he quit at the end of his 24th lap. Compared to other cars at the track, the Alfa Romeo was not particularly fast, qualifying at 119.968 m.p.h.

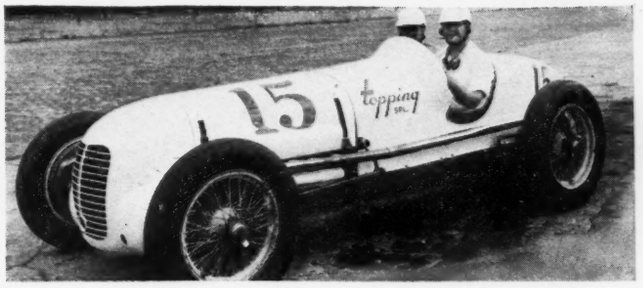


The Miller powered Duray Spl., driven by Wearne was fitted with a Switzer-Cummins supercharger



While not finished in time for qualification the Lee Oldfield-designed 16 cylinder job, with all four wheels independently sprung and with the engine mounted in the rear was particularly interesting





The Maserati driven by Babe Stapp passed out of the picture in the 36th lap, clutch trouble being the difficulty

Indianapolis Entrants

Car No.	Make	Driver	Engine Make	No. of Cylinders	Bore	Stroke	Displacement	Supercharged	Engine Head	Carb Make	Carb No.	Spark Plugs	Ignition	Ignition Cable	Pistons	Piston Rings	Drive React	Drive	Starter	Shock Absorbers Front	Shock Absorbers Rear	Brakes	Fuel	Oil	Weight	Qualifying Time
1	Burd Piston Ring Special	Mauri Rose	Off	4	4.315	4.625	269	N	O	M	2	C	B	P	R.D.	Burd	T	R	B	G	H	H	Gil	Gil	1875	118.540
2	Boyle Products Spec.	Louis Meyer	Miller	8	3.379	3.750	269	N	O	M	4	C	B	P	R.D.	P.C.	T	R	B	H	H	M	G	O	2156	119.619
3	Miller-Hartz Spec.	Ted Horn	Miller	8	2.875	3.500	182	Y	O	W	2	C	B	P	R.D.	P.C.	H	F	H	H	H	M	G	G.C.	1850	.....
5	Sparks Spec.	Jimmy Snyder	Sparks	6	3.875	4.750	337	Y	O	W	1	C	B	P	Jahns	P.C.	T	R	H	H	Ho	H	Gil	Gil	1993	125.287
6	Shaw-Gilmore Spec.	Wilbur Shaw	Off	4	4.250	4.500	255	N	O	W	2	C	B	P	R.D.	Burd	T	R	B	G	G	M	Gil	Gil	1834	122.791
7	Boyle Products Spec.	Chet Miller	Miller	8	2.656	3.500	155	N	O	W	4	C	B	P	R.D.	P.C.	H	F	H	H	G	M	G	O	1827	119.213
8	Hamilton & Harris Spec.	Ralph Hepburn	Off	4	4.250	4.500	255	N	O	W	2	C	B	P	R.D.	P.C.	T	R	B	H	Ho	M	Gil	G.C.	1889	118.809
10	Miller Spec.	Billy Winn	Miller	4	4.250	4.500	255	N	O	M	2	C	B	P	R.D.	P.C.	T	R	B	H	G	H	G	G	1857	119.922
12	R & S Spec.	R. Snowberger	Pack	8	3.250	4.250	282	Y	L	W	2	C	B	P	R.D.	P.C.	H	F	..	H	H	M	Gil	Gil	2099	117.354
14	Bowes Sealfast Spec.	Rex Mays	Alfa-Romeo	8	3.071	3.937	232	Y	O	W	2	B	B	P	....	P.C.	H	R	H	..	..	H	Gil	Gil	1831	119,968
15	Topping Spec.	Babe Stapp	Maserati	V-8	3.385	4.200	305	Y	O	W	2	B	B	B	....	P.C.	H	R	H	H	H	H	Gil	Gil	1935	117.226
16	Boyle Products Spec.	Bill Cummings	Off	4	4.250	4.500	255	N	O	W	2	C	B	P	R.D.	P.C.	H	F	D	H	H	M	G	O	1932	123.445
17	Marks-Miller Spec.	Geo. Connor	Miller	4	4.250	4.625	262	N	O	W	2	C	B	P	R.D.	P.C.	T	R	B	HF	HF	M	Gil	Gil	1862	120,240
21	Elgin Piston Ring Spec.	Duke Nalon	Brisko	6	4.725	4.375	350	N	O	W	3	C	B	P	R.D.	P.C.	T	R	D	G	L	M	Gil	Gil	2067	.....
22	Thorne Spec.	Joe Thorne	Off	4	4.078	4.250	222	N	O	W	2	C	B	B	Jahns	P.C.	H	F	B	G	G	H	Gil	Gil	2052	115,607
23	Topping Spec.	R. Householder	Miller	4	4.062	4.500	233	N	O	W	2	B	B	B	....	P.C.	..	R	D	Ho	Ho	H	Gil	Gil	1828	116,464
24	Elgin Piston Pin Spec.	Frank Brisko	Own	6	4.125	4.375	350	N	O	W	3	C	B	P	R.D.	P.C.	H	F	..	HF	HF	H	G	G	....	118.213
25	Petillo Spec.	Kelly Petillo	Off	4	4.500	5.000	318	N	O	W	2	C	B	P	R.D.	P.C.	T	R	B	G	H	M	G	O	....	124.129
26	F W D Spec.	Tony Wilman	Miller	4	4.250	4.500	255	N	O	W	2	C	B	P	R.D.	Hast	H	4	B	HF	HF	M	Gil	Gil	2315	118.242
28	Miller Spec.	Billy De Vore	Miller	4	4.250	4.500	255	N	O	W	2	C	B	P	R.D.	P.C.	T	R	B	G	G	H	G	G	....	118.694
31	Burd Piston Ring Spec.	Chet Gardner	Off	4	4.250	4.500	255	N	O	W	2	C	B	P	R.D.	Burd	T	R	B	H	G	H	G	G	1953	117.342
32	Thorne Spec.	Floyd Davis	Miller	4	4.250	4.500	255	N	O	W	2	C	B	P	Jahns	P.C.	T	R	D	H	H	H	Gil	G.C.	1812	118.942
33	Fink Auto Spec.	Bob Swanson	Off	4	4.250	4.750	269	N	O	W	2	C	B	P	Jahns	P.C.	T	R	B	Ho	Ho	H	Gil	Gil	1935	121.920
34	Bowes Sealfast Spec.	Shorty Cantlon	Miller	4	4.140	4.250	234	N	O	W	2	C	B	P	R.D.	P.C.	T	R	B	G	G	M	Gil	Gil	1818	118.555
35	Motorola Spec.	Deacon Litz	Miller	4	4.112	4.250	225	N	O	W	2	C	B	P	R.D.	P.C.	T	R	B	G	H	H	Gil	Gil	1914	116.372
36	Shafer Eight Spec.	Geo. Barringer	Buick	8	3.250	3.875	256	N	R	W	4	C	D	P	R.D.	P.C.	T	R	D	Ho	Ho	M	G	G	....	.....
37	Precise Too! Spec.	Ira Hall	Stude	8	3.062	4.250	250	N	L	W	4	C	B	P	R.D.	P.C.	H	R	D	Ho	Ho	H	Gil	Gil	1843	.....
38	Burd Piston Ring Spec.	Tony Gulotta	Off	4	4.250	4.500	255	N	O	W	2	C	B	P	R.D.	Burd	T	R	B	H	H	H	Gil	Gil	1922	118.788
39	Belanger-Miller Spec.	Frank McGurk	Miller	8	3.3125	3.750	258	N	O	W	4	C	B	P	Jahns	P.C.	T	R	B	H	H	M	Gil	Gil	1962	.....
41	Lucky Teter Spec.	Ken Fowler	McD	4	4.062	4.500	233	N	O	W	2	C	B	P	R.D.	P.C.	H	R	F	H	H	M	G	G	1910	117.421
42	Thorne Spec.	Al Miller	Miller	4	4.250	4.500	255	N	O	M	2	C	B	P	R.D.	P.C.	T	R	D	S	S	H	Gil	Gil	1820	118.518
43	Duray-Sims Spec.	Geo. Bailey	Miller	4	4.102	4.250	220	Y	O	W	1	C	B	P	R.D.	P.C.	T	R	B	L	L	H	Gil	Gil	1870	117.497
44	Duray Spec.	Frank Wearne	Miller	4	4.102	4.250	220	Y	O	W	1	C	B	P	R.D.	P.C.	T	R	B	L	L	M	Gil	Gil	1855	.....
45	Mid West Red Lion Spec.	Cliff Bergere	Off	4	4.250	4.500	255	N	O	W	2	C	B	P	R.D.	P.C.	T	R	D	H	Ho	H	Gil	Gil	2040	117.546
46	Shafer Eight Spec.	Al Putnam	Buick	8	3.181	4.625	294	N	R	W	4	C	D	P	R.D.	P.C.	T	R	D	G	G	M	G	G	2296	.....
47	Sullivan-O'Brien Spec.	H. MacQuinn	Miller	4	4.062	4.750	247	Y	O	W	2	C	B	P	R.D.	P.C.	T	R	D	L	L	H	Gil	Gil	1980	121.822
48	Carew Spec.	Emil Andres	Cragar	4	4.000	4.250	215	N	O	W	2	C	B	P	R.D.	P.C.	T	R	B	Ho	Ho	H	G	G	2019	.....
49	Kimmel Spec.	Henry Banks	Volker	V-12	3.062	3.750	332	N	O	Z	3	C	B	P	....	P.C.	T	R	B	G	H	M	T	V	1960	.....
51	Stewart Spec.	John Seymour	Miller	4	3.125	4.375	256	N	O	W	2	C	B	P	Own	P.C.	T	R	B	L	L	H	Gil	G.C.	2140	.....
52	Thorne Spec.	Zeke Meyer	Stude	8	3.062	4.250	250	N	L	W	4	C	B	P	R.D.	P.C.	H	F	D	G	G	M	Gil	Gil	2086	.....
53	S. S. Eng. Spec. (Sobonite)	Louis Tomei	Stude	8	3.500	4.375	336	N	L	S	4	C	B	P	R.D.	P.C.	H	R	D	Ho	Ho	M	Gil	Gil	2490	116.437
54	Chicago Rawhide Oil Seal Sp.	Herb Ardinger	Off	4	4.250	4.500	255	Y	O	W	1	C	B	P	R.D.	P.C.	T	R	B	Ho	Ho	M	Gil	Gil	2169	121.983
56	Lafayette, Ind., Spec.		Duesen	8	2.947	5.000	263	N	R	W	..	C	B	P	....	P.C.	T	R	..	H	H	H	G	G	....	.....
58	Superior Trailer Spec.	Lewis Webb	Miller	4	4.062	4.750	246	N	O	W	2	C	B	P	....	P.C.	H	F	D	H	H	M	Gil	Gil	2027	.....
57	Superior Trailer Spec.	Doc Williams		V-8	3.062	3.750	221	..	L	..	..	..	..	..	....	....	..	..	..	..	..	..	G	G	....	.....
61	Yeager Spec.	Ray Yeager	Stude	8	3.250	4.250	250	N	L	W	4	C	B	P	R.D.	P.C.	H	R	..	Ho	Ho	H	G	G	2119	.....
62	Thorne Spec.	Floyd Roberts	Miller	4	4.250	4.750	269	N	O	W	2	C	B	P	Jahns	P.C.	T	R	B	HF	HF	M	Gil	G.C.	1954	116.996
63	Wehr 2-cycle Rotary Valve Sp.	Thos. Cosman	Wehr	4	4.000	4.250	213	Y	..	W	1	C	B	P	....	P.C.	H	R	B	HF	HF	M	Gil	Gil	1986	.....
64	Wehr 2-cycle Rotary Valve Sp.			..	..	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..	..	..	..	....	.....
65	Crystal Flash Spec.	Milt Marion	Miller	4	4.062	4.500	238	N	O	W	2	C	B	P	R.D.	P.C.	T	R	B	H	H	H	C.F.	C.F.	1825	.....
72	Oldfield Spec.	Lee Oldfield	Marmon	V-16	2.697	4.000	365	Y	R	S	1	C	B	P	....	P.C.	R.R.	R	H	L	L	H	Gil	Gil	....	.....
66	Mannix Spec.	Overton Phillips	Dues	8	2.687	5.000	265	N	R	W	4	C	B	P	....	P.C.	T	R	D	HG	HG	H	Gil	Gil	2190	.....
67	Ray Eight Spec.	Venn. Orenduff	Stude	8	3.062	4.250	250	N	L	W	4	C	B	P	....	P.C.	H	R	D	H	H	H	Am	Gil	2232	.....

ABBREVIATIONS:

Engine Make
Off—Offenhauser
Pack—Packard 120
McD—McDowell

Engine Head
O—Overhead Camshaft
L—"L" Head
R—Overhead Rocker Arms

Supercharged
Y—Yes N—No

Carburetor
M—Miller
W—Winfield
Z—Zenith
S—Stromberg

Shock Absorbers
G—Gabriel
H—Hartford
HF—Hartford-Fageol
S—Sciata

A—Andre
L—Lovejoy
HG—Hartford-Gabriel
Ho—Houde

Spark Plugs
C—Champion
B—Bowes

Ignition
B—Bosch Magneto
D—Delco

Brakes
H—Hydraulic
M—Mechanical

Ignition Cable
P—Packard
B—Beldin

Fuel
G—Gulf
Gil—Gilmore
T—Tydol

C.F.—Crystal Flash
Am—Amoco

Oil
G—Gulf
Gil—Gilmore
G.C.—Gilmore Casteroil
O—Oilzum
V—Veedol
C.F.—Crystal Flash

Pistons
R.D.—Ray Day

Piston Rings
P.C.—Perfect Circle
Hast—Hastings

Drive Reaction
T—Torque Tube
H—Hotchkiss or through Springs
R.R.—Radius Rods

Drive
F—Front
R—Rear
4—Four Wheel Drive

Starter
B—Bosch
D—Delco
H—Hand crank
F—Ford make

How They Finished

Finish Position	Driver	Number of Car	Car	M.P.H.	Cause of Withdrawal	Number of Pit Stops	Withdrawn in Lap No.
1	Shaw	6	Gilmore-Shaw	113.580	.....	2	.....
2	Hepburn	8	Hamilton-Harris	113.560	.....	3	.....
3	Horn	3	Hartz Spl	112.079	.....	4	.....
4	L. Meyer	2	Boyle Spl	110.730	.....	4	.....
5	Bergere	45	Midwest Red Lion	108.935	.....	4	.....
6	Cummings	16	Boyle Spl	107.123	.....	6	.....
7	Devore	28	Miller Spl	106.995	.....	5	.....
8	Gulotta	38	Burd Piston Ring	105.015	.....	5	.....
9	Connor	17	Marks Miller Spl	103.830	.....	3	.....
10	Tomei	53	Sobonite Plastic	101.825	.....	5	.....
..	Gardner	31	Burd Piston Ring	.....	Run. at finish	6	.....
..	Roberts	62	Thorne Spl	.....	Run. at finish	3	.....
..	Householder	23	Topping Spl	.....	Run. at finish	4	.....
..	Cantlon	34	Bowes Sealfast Spl	.....	Run. at finish	6	.....
..	Rose	1	Burd Piston Ring	.....	Bkn. Oil Line	5	128
..	Snyder	5	Sparks Spl	.....	Trans. failure	1	28
..	C. Miller	7	Boyle Spl	.....	Ign. failure	1	36

Finish Position	Driver	Number of Car	Car	M.P.H.	Cause of Withdrawal	Number of Pit Stops	Withdrawn in Lap No.
..	Winn	10	Miller Spl	.....	Bkn. Oil Line	3	85
..	Snowberger	12	R. & S. Special	.....	Clutch failed	4	67
..	Mays	14	Bowes Seal Fast	.....	Overheating	2	24
..	Stapp	15	Topping Special	.....	Clutch failed	3	36
..	Brisko	24	Elgin Piston Pin	.....	No oil pres	4	106
..	Petillo	25	Petillo Special	.....	Out of oil	2	109
..	Wilman	26	Four-Wheel Drive	.....	Bkn. con. rod	2	95
..	Davis	32	Thorne Special	.....	Crashed	5	190
..	Swanson	33	Fink Auto Special	.....	Carburetor	2	62
..	Litz	35	Motorola Special	.....	Out of oil	5	192
..	Fowler	41	Lucky Teetor Special	.....	Pushed car	7	116
..	Al Miller	42	Thorne Special	.....	Carburetor	7	170
..	Bailey	43	Duray Sims Special	.....	Clutch failed	2	107
..	Wearne	44	Duray Special	.....	Carburetor	5	99
..	McQuinn	47	Sullivan-O'Brien	.....	Broke piston	2	48
..	Ardinger	54	Chi. Rawhide Oil Seal	.....	Bkn. con. rod	3	106

"You Can Eat Off The Floors"

Shop cleanliness is more than a virtue—it's a merchandising factor that brought Bill Hedges of Portsmouth, O., a bigger and better volume of business

"THE cleanest shop in the States," or "You can eat off the floor" are the two phrases most often applied to Bill Hedges' shop in Portsmouth, Ohio. And that it pays is seen from the fact that in 1936 Bill took in 14,000 bucks. And that is a lot of money when you consider that Portsmouth is a small steel mill town of about 45,000 people.

But business wasn't always that good—far from it. Back in 1930 Bill's shop was owned and operated by Murfin and Murfin and the take was only $7,000 per year and getting nowhere fast. Brake service was the only work done and competitors were getting an ever increasing share of the town's business.

At the instigation of Earl Koch, Bendix distributor in Cincinnati, Bill Hedges took the job of manager for Murfin and Murfin. Seeing the potentialities of the business Bill bought them out in 1934 and then proceeded to go to town.

Clean-up and paint-up were the first jobs to be done and then when the shop was "the cleanest in the States" Bill went after customers by direct mail. For the most part he used postal cards with pictures of the shop and brief selling messages.

In addition to brakes Bill now does lubrication, engine tune-up, wheel alignment, etc., and uses lubrication jobs as an opportunity to inspect the cars for additional services that could be sold.

Courtesy Chevrolet

Service Hints

From the Factories

Oldsmobile Lubricants

IN a special letter to Oldsmobile dealers, J. J. Dobbs, general service manager, states that reports have come from various sources since the start of 1937 production that cars had reached the field with an insufficient supply of lubricant in the rear axle. This impression has been gained from the fact that the lubricant does not run from the filler hole and appears to be too low in the housing. The reason the lubricant appears to be low when checked at shipping destination is that a certain amount of the lubricant adheres to the axle parts. When the lubricant is put into the rear axle at the factory, the chassis is suspended upside down and when the chassis is revolved to normal position, a certain amount of lubricant adheres to the axle parts. Hypoid lubricant is much more tacky than the lubricant used in past model differentials and for that reason a greater quantity adheres to the upper part of the differential and does not settle to normal level as quickly. If the lubricant does rise up to within ¼ in. of the filler plug hole with car in normal position, the axle will be sufficiently lubricated. When checking level of lubricant in rear axle of car just recently driven, sufficient time should be allowed for oil to drain from parts and seek its normal level before check is made.

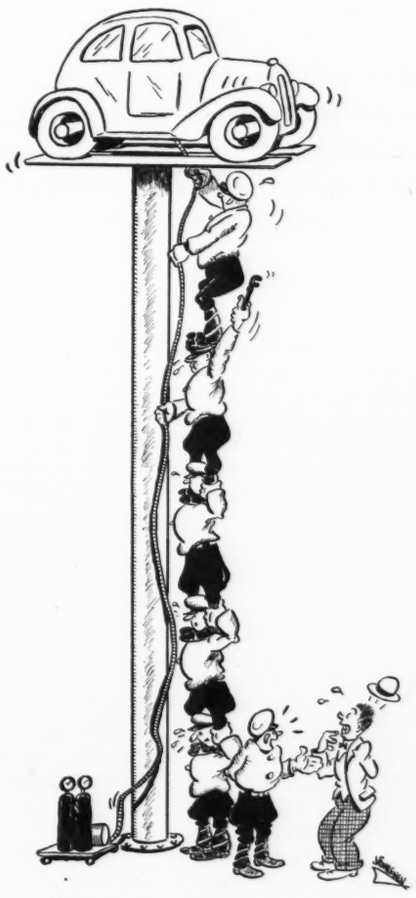
* * *

Chevrolet Main Bearing Journals

MAIN bearing journals on the 1937 Chevrolet engine are larger in diameter and the bearings are diamond bored. Because of this, bearing adjustment can be made more carefully. To adjust—first loosen front and center main bearings. Then, start with the rear bearing and remove shims evenly until there is a slight drag on the crankshaft, turning it by hand with the bolts pulled down tight. Then, add one .002 inch shim for clearance. Again tighten the bolt and check for drag. The shaft should now roll freely.

Loosen the bolts on the bearing that has just been adjusted and proceed to adjust the next one in the same manner and so on until all bearings have been adjusted.

Shims should be removed evenly. If an uneven number of shims have to be used, it is good practice to have the greatest number for each bearing on one side, principally on the camshaft side.



"The control system's on the fritz again!"

* * *

Dodge "A" and "B" Engine Numbers

ON the 1937 Dodge cars, the letter "A" with the engine number indicates "special standard" cylinder bores, which is a 0.020 in. larger standard. The letter "B" with the engine number indicates "special standard" main and connecting rod bearings which is a 0.010 in. smaller standard. The letters in the circular pad at each end of the engine number pad are for the use of factory inspectors only and should not be used in connection with the engine number.

* * *

Carter Bulletin on Olds Carburetor

ACCORDING to a recent service bulletin from Carter Carburetor Corp., complaints of hesitation on part throttle acceleration from low speed on 1937 Oldsmobile eight equipped with 345-S carburetor can be overcome by installing metering rod No. 75-224 in place of metering rod No. 75-195. The change of metering rods plus motor tune-up will insure satisfactory performance.

* * *

Chevrolet Skirt Piston

GREATER care much be exercised when fitting the new slipper skirt piston used on the 1937 Chevrolet because they can be damaged by careless handling. Do not exert heavy pressure on the piston when pushing it into the cylinder bore to check it with a feeler gage. The piston should pass all the way down the bore with a .002 inch feeler placed at right angles to the piston pin but should block on a .003 inch feeler.

BILL TOBOLDT, Editor of MOTOR AGE, conducts the Readers' Clearing House. He presents some of the thousands of questions asked by readers of Motor Age together with a practical analysis of the difficulties in his replies. You, too, are cordially invited to send us your problems.

A Regular Reader Asks Us Another

The car in question is a Plymouth 1933 DeLuxe sedan with free wheeling and automatic clutch units.

Some time ago the rear main bearing was leaking oil and it was so bad that oil finally got into the clutch and after a while the clutch started to grab. The longer I used it the worse the clutch got. At last, I took the clutch out and put new oil seals on the rear main, the clutch facings were renewed and clutch and transmission replaced.

When I started the car and pressed the clutch pedal in, the clutch release bearing made a whr-r-ring noise as though it was dry of grease. I tried greasing it but no luck—the same noise. Clutch shaft pilot bearing was also packed with vaseline.

The pressure plate adjustments were not changed and the clutch pedal has the proper clearance at the floorboards. The clutch works fine except the clutch release bearing makes a terrible dry ringing noise—it did not do it before it was taken apart.

Now, this spring, in a hard pull in second gear, it slipped into free wheeling making a terrible noise. I released the clutch in an instant. I figured something was broken, but everything seemed O.K. I took it out of free wheeling and drove on—no trouble at all. But, after driving for some time a noise developed which sounded like a tooth was broken out of a gear. A terrible click developed in first and second speeds. So, I took the transmission out—no broken gears. But, the snap ring on the transmission drive pinion was broken off and the shims were worn quite bad.

I put in the proper shims—pressed in a new snap ring. Every part in the transmission looked O.K., free wheeling and all. The countershaft gear (clutch gear) was quite loose on the shaft and had some end play.

While I had the transmission out, I took the clutch release bearing apart and packed it with good fiber grease and put the transmission in place. To my surprise, the clutch release bearing made the same noise but not so loud and some times it doesn't make a noise at all—very seldom. Clutch works fine. Could it be caused by the clutch release levers? Everything was put in its right place. Nowlin Jacobson, Powell, S. D.

FIRST of all, I think the whirring noise in your clutch is the result of uneven adjustment of the clutch fingers. The only way these can be adjusted properly is by means of a regular clutch adjusting jig. As a general rule, such jigs are only found in the larger establishments or in the jobbers who have a machine shop for doing work for their shop customers.

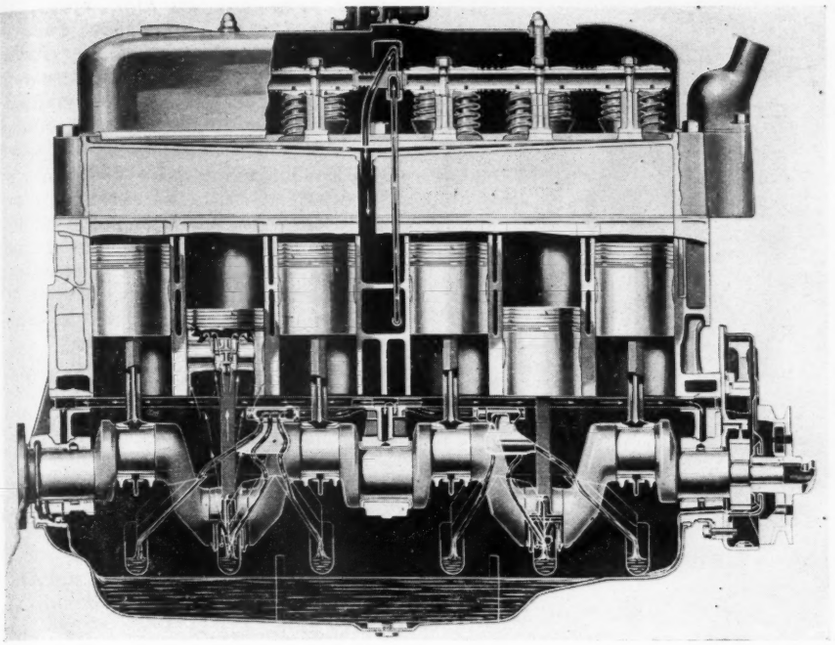
However, I am quite sure that if these fingers are properly adjusted you will get away from the noise.

Now on your transmission, I am quite sure that if you carefully examine the gears that you will find some of the teeth marked or chipped in some way which will cause a click. The teeth were marked or chipped when the snap ring broke and a portion of it got between the teeth of the countershaft and the mainshaft. I would suggest that you examine these teeth very carefully and, if necessary, use a magnifying glass. Install new gears and your troubles will be over.

An Old Timer!

I have a Columbia car made by the Electric Vehicle Co. of Hartford, Conn., the maker's number being 280. *I am desirous of knowing what year this car is, and if you can help me I shall be greatly obliged. Fred W. Urban, Westfield, N. J.*

THE Columbia Electric manufactured by the Electric Vehicle Co. of Hartford, Conn. (which we have illustrated here) was built in approximately 1900. The company started in business two years prior, that is, in 1898.



Stopping a Mysterious and Baffling Oil Leak

I have a 1934 Master Chevrolet that has an oil leak that we can't seem to stop. We have put a complete set of gaskets on it, even a timing gear cover gasket.

We took up the mains and rods and after we completed the job it started to leak oil out of the front of the motor. The oil seems to run out and down onto the cross member under the radiator. At first we thought that it was the main bearing so we took it off and put a gasket on it and it still leaked, then we took the timing gear cover off and put a new gasket on it and it didn't seem to check it and we have asked other garage men about it and they don't know what could be the trouble. Martin Ward, Quinter, Kans.

I BELIEVE that the trouble on your 1934 Master Chevrolet is caused by a broken timing gear oil nozzle. As a matter of fact, it might be entirely missing. This oil nozzle is screwed into the engine block on the timing gear side and is located above and between the two timing gears. If this nozzle is not in place, it will result in an excessive amount of oil reaching the timing gears and will then result in a leak.

In addition, you want also to be sure that the oil return hole from the timing gear case into the oil pan is clear and provides ample drainage.

How To Improve Gas Mileage and Speed

I have a 1930 Model A Ford that had a reconditioned motor put in it a year ago. The motor now has 10,845 miles on it. It has never had the proper speed and it has a vibration up to 30 m.p.h. I have checked the timing and also had several good mechanics check the timing. I put on three different carburetors, one was a new Tillotson model and one regular Model A carburetor, and one regular with an adjustable high speed jet. I have ground the valves and set them to .012 inch clearance. I have checked the timing gears to see that they were properly set—which they were. I have also checked the compression and it is 60 lbs. on each cylinder.

This car gets only 15 miles to the gallon of gas and its top speed is 50 m.p.h. If you can give me some information on what to do to get better gas mileage and more speed out of the car, it will be appreciated very much.

The clutch does not slip and there are no knocks and the mains are in good condition. Francis Helm, Gateway Garage, Las Vegas, Nevada.

THE first thing I would do would be to check the ignition distributor and make sure that it is in perfect condition. I would also install a new distributor coupling shaft since wear in the tongue and groove connection invariably results in reduced top speed and lower fuel economy.

Equally important is the electrolock cable. In general, these electrolock cables gave trouble after about 40,000 or 50,000 miles and I would certainly advise the installation of a new one.

The Brake Noise That Keeps Coming Back

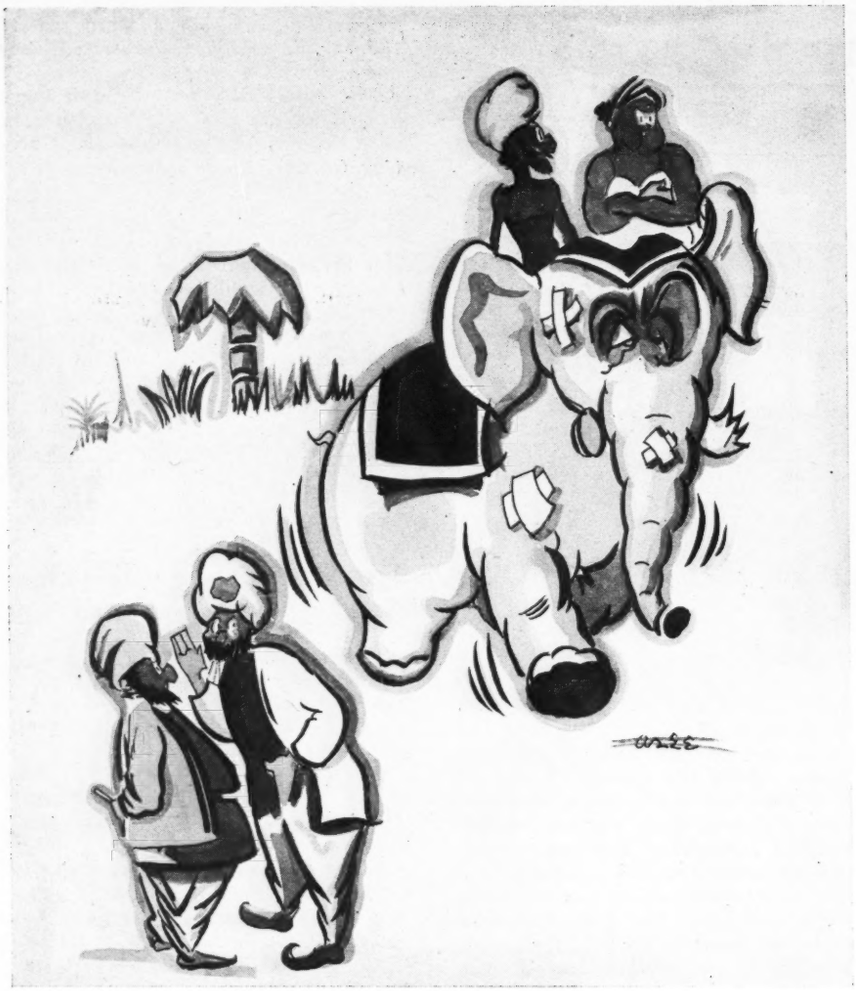
I am having trouble with a 1936 Dodge right rear wheel squeaking. I have installed rear wheel grease retainers which removed the noise for a few miles.

Th last time I soaked grease retainer in oil for one week which removed the noise for a few more miles, now the noise is back.

The factory service man said the leather was sticking to hub of wheel and turns in retainer. I certainly want to remove the noise. Delbert Gwin, 508 N. 11th St., New Castle, Ind.

THE trouble you are experiencing with the squeak in the rear wheel on the 1936 Dodge, I am quite sure you will find to be caused by poorly

Mechanic: "D'you know anything about a carburetor, buddy?"



"Maharajah's wife is learning to drive, I see"

fitting axle shaft key, or that you haven't drawn up the axle shaft nut tight enough.

I would suggest that you remove the drum and hub assembly and carefully examine the keyway in the hub and in the axle shaft and also the tapered end of the shaft and its mating surface in the hub. A careful examination will show whether or not you are getting a full bearing surface on the tapered end of the shaft. If you don't have at least 75 per cent bearing surface, it is probably caused by a key that is too tight with the result that the hub rides on the key rather than on the tapered end of the shaft. Also make sure that there are enough threads on the end of the axle shaft for the nut to pull up the hub tight.

Service Tip

IT is extremely important that the rectangular vent hole in the filler neck baffle or 1937 Ford cars should not be closed with solder. It is through this hole that air pressure in the top of the radiator pan is relieved, and should the hole become clogged with solder, a slight loss of water may be experienced.

New Gasket May End Carburetor Noise

I am having trouble with a 1932 PB Plymouth carburetor. I have done everything I can think of but the car will not idle.

I can adjust the carburetor and it will be all right for a day or so. I have installed new points, new condenser, new coil, new plugs, ground the valves, checked the timing. But, I have had no success. The carburetor has a chattering noise in it when idling. It is a Carter carburetor. The motor runs fine at high speed, it will do 65 m.p.h. with ease. I have been a reader of the Clearing House for some time and will appreciate any advice you can give. An Ohio Subscriber.

THE chattering noise you are experiencing with the carburetor on your 1932 PB Plymouth is caused by the gasket at the upper end of the step-up piston. It can be corrected by making the hole 9/32 inch instead of 7/32 inch. However, a better plan will be to install a new gasket.

There is also another vibrating noise which is due to an air leak between the upper and main casting. The remedy for that is the installation of a new No. 121-17 gasket and in some cases also truing the surface of the upper casting.

Generally speaking, anything that prevents free movement of the step-up piston such as a gummy surface, dirt accumulation, etc., will result in a noisy unit.

Any Carter carburetor jobber can supply you with the necessary parts.

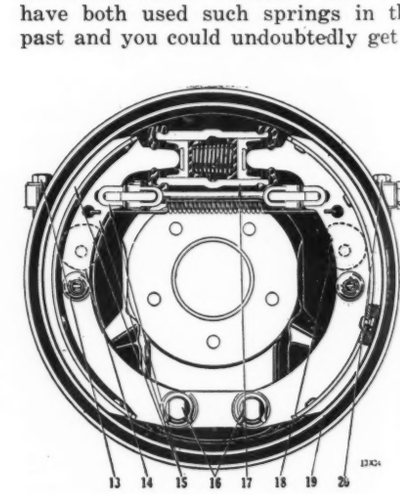
Don't Cuss Write Us

A bunch of the boys are saving time and money by sending the tough ones to the Readers' Clearing House for solution. When writing please use your business letterhead or attach a business card, to indicate your connection with the automotive trade. Name and address will be withheld from publication on request.

How To Eliminate Squeaking Brakes

Can you tell me how to eliminate squeaking brakes on 1936 Dodge and Plymouth cars? Detroit Subscriber.

ASSUMING that you have properly adjusted the brakes of the Dodge and Plymouth cars which are squeaking, the best method of overcoming the trouble would be to attach a coil spring around the outer surface of the brake drum. Cadillac and Olds have both used such springs in the past and you could undoubtedly get a



spring from those companies which could be used on Dodge or Plymouth cars. Some shops have utilized a screen door spring in the same manner.

You might also try cutting off about 1 inch of lining from the end of each shoe. This would serve to increase the unit pressure and assist in reducing the tendency to squeak.

Equalizing Front Brakes

I have had two 1935 Oldsmobiles in for brake adjustment that I have not been able to get the two front brakes equalized. I have changed all the adjustments, bled the lines but have been unable to equalize. Would you please explain what is the matter? A Reader.

THE first thing to do on your 1935 Oldsmobile is to remove the wheel cylinders and after honing, install new piston cups. In addition, make sure that the same length of lining is used on the primary shoes on each side of the car and also that the same length of lining is used on the secondary shoes on each side of the car. By the same length of lining, I mean you should measure the distance from the last rivet holes to the end of the lining.

Of course, I am assuming that the linings are not oil soaked and that they have been adjusted to the proper clearance.

Worn Bushing Is Cause of Starter Trouble

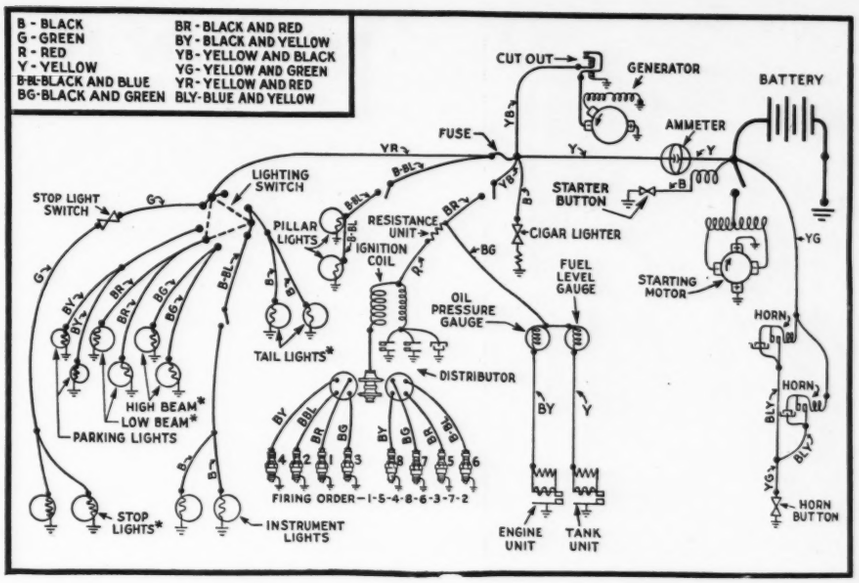
Please give me what information you can and all possibilities you can, so that I can solve the trouble I am having with a starter on a 1929 Chevrolet. The trouble is the starter will not whip the engine over fast enough so the engine could start. The pig tail wires are soldered good and tight to the terminals, brush springs have their normal tension, two of the brush holders are grounded and two insulated as they should be. Each field coil draws about 11 amperes on one battery cell, the armature wires are well soldered in the riser. The armature has not been hitting the fields. I had the starter running for a short time and noticed it got a little warm. I used a different battery and also used other battery cables and used the battery wire so it would not go through the starter switch but all this work did not help and if you can help me out of this trouble I would appreciate it very much. A Nebraska Subscriber.

I AM quite sure that you will find the trouble you are experiencing in the starter of your 1929 Chevrolet to be caused by a worn bushing on the armature shaft. If the armature shaft is not scored, the trouble can be overcome by installing a new bushing. Otherwise, it will be necessary to turn down the armature shaft and install an undersize bushing.

Incidentally, the starting motor should draw 65 amperes at 5 volts when running free at 5000 r.p.m., that is, without any load.

I also think it would be advisable to check the armature for a bent shaft.

Of course, there is also the possibility that the trouble is not in the starter but something in the engine. This can easily be checked, of course, by cranking the engine by hand and if it is difficult to crank, the trouble is, of course, in the engine and not in the starting motor. You might also check the armature on a growler.



Wiring diagram of the 1937 Ford V-8

Overcoming Oil Trouble

I am having trouble with my 1936 Chevrolet. The oil seems to pump up along side the distributor and seems to flow from directly under distributor at all speeds. Oil pressure is 15 or less.

I am losing two quarts to five hundred miles and what can I do to correct this. H. Tappmyer, Jr., 102 18th Ave., East Moline, Ill.

THE difficulty on your 1936 Chevrolet that is losing oil around the distributor shaft is caused by a clogged drain hole. This drain hole leads from underneath the bearing down into the crankcase. Cleaning out this drain hole will overcome your trouble.

Chilton Tune-up Manual

Do you publish a book of data such as valve and ignition timing of the various makes and models of automobiles as late as 1929. Please advise. William Fowles, c/o Davis Motor Sales, 8201 W. Grand Ave., River Grove, Ill.

IN accordance with your request, I am mailing you a copy of the Chilton Tune-up Manual which gives the valve and ignition timing together with other tune-up data on all cars from 1929 up to and including 1937.

"Glad to see you, Fred—I haven't had a thing to do all day"

News of the Trade

Executive Meeting of IG & MA Council Chiefs

The annual meeting of the Executive Council of the International Garage & Maintenance Ass'n was held in Chicago April 24-25. Attended by Zone and State Chairmen, members of State Councils, Executive Officers from Minneapolis, Kansas City, Indianapolis, Oklahoma City, St. Louis, Cleveland, Milwaukee, Detroit, Toledo, Rockford, Fort Wayne and Urbana, the trade was well represented.

Because trends and developments during the past few years appears to be weakening the position of independent operators, a more definite and aggressive policy for the independent trade, and a program involving a closer working cooperation among independent operators, jobbers and independent manufacturers was mapped out and adopted.

Among other national committees appointed is the Trade Labor Relations Council composed of Mel Turner and Floyd Fullerton, Chicago; Clyde Smila, Cleveland; Ralph Robinson, Minneapolis; Fred Warrick, Kansas City; Paul Rossman, Milwaukee, and K. S. Kingore, Knoxville, Tenn.

Acceptance of the appointments of three Zone and four State Council Chairmen were approved. Matters such as insurance adjustments, car manufacturer and dealer relations, etc., will be handled by the Executive Council as a committee. Dates and location for the annual national trade conference will be announced later.

Pontiac Assistant G. M.

Appointment of Robert H. Ahlers to the newly created post of assistant general manager of the Pontiac Motor Division of General Motors was announced last month by H. J. Klingler, general manager.

The appointment is effective immediately and Mr. Ahlers will report directly to P. H. MacGregor, general plant manager, Mr. Klingler said.

Crack World's Records

Britishers Set New 24-Hr. Marks At Montlhery Track

With a total distance of 2329.2 miles, average 97.05 m.p.h., G. E. T. Eyston and Albert Denly broke the world's 24-hr. heavy oil engine record, on Montlhery track, near Paris. The two Britishers also secured the world's 12-hr. record, with an average of 99.03 m.p.h., also world's records for 1000 kilometers, 1000 miles, 3000 kilometers and 2000 miles.

Making a separate run, Eyston secured the world's hour record with a speed of 105.597 m.p.h. The highest speed attained was 106.27 m.p.h., constituting the world's 50 kilometer record. In all cases, the competitor broke his own records, the previous best for the 24 hours being 94.99 m.p.h.

The car used for this performance was an open job equipped with a six-cylinder A.E.C. engine of 115 by 146 mm. bore and stroke, similar in all essentials to those used on London buses.

Down the Column:

Bailey's Break-up: Frankie Bailey, 1936 Eastern AAA champ, was injured last month at Langhorne when his car crashed through the fence. Three spectators were killed, another injured

Boxer Turns Speedster: Enzo Fiermonte (standing) retired from prize fighting when he married socially prominent Mrs. Madeline Astor Dick. Fiermonte with George Rand (seated) intend to enter and drive their Maeserati at Roosevelt Raceway, July 3

Natural Gas: Natural gas drives this car. Stored in tanks under 210 lbs. pressure, which is reduced to admospheric pressure by means of three governors, the gas is then drawn into the carburetor

Cross-Country Race: Below are shown some of the jittering jallopies owned by students at Fresno (Calif.) State College entered in an unique 5-mile cross-country auto race

Union Drive Opened On Ford Employes

The United Automobile Workers union is gradually closing in on the Ford Motor Co., the last important objective in its drive to organize the automotive industry, it was reported late last month. Two former branch bank buildings have been leased in the vicinity of the Rouge plant which will serve as campaign headquarters.

Strategy is being developed by the committee. Up to the present time, Ford workers joining the UAW have been registered on union books only by numbers but hereafter names are to be enrolled although membership lists will remain secret.

Meanwhile Ford opened his defensive campaign by distributing 150,000 "Fordism" cards and pamphlets among the company's workers throughout the United States. In these, Ford outlined briefly his views on unionism. He asked his workers to consider if "it is necessary to pay some outsider every month for the privilege of working at Ford's." "Figure it out for yourself," he tells his men, "if you go into a union, they have got you and what have you got? A monopoly of jobs in this country is just as bad as a monopoly of bread." Another "Fordism" asks: "What was the result of these strikes? Merely that a number of men put their necks into an iron collar. We're only trying to show who owns the collar."

Answers to the "Fordisms" are easy, says UAW president, Homer Martin.

"Organized automobile workers will say, 'We have wage increases (as much as 45 cents an hour in some cases); we have a slower, more humane speed on the line; we are winning a more nearly adequate protection against occupational diseases and industrial accidents; we have job security; and we have our own democratically-controlled union to protect the gains we've made.'

"Ford workers have none of these things—but they're going to get them. Neither Mr. Ford nor his 'isms' will make any impression on his workers," Martin confidently declared. "These employes are the ones that every day encounter his inhuman speed-up and a brutal service department. They aren't fooled by words," was his further comment.

An independent union, known as the Society of Tool & Die Craftsmen, has launched a campaign to enlist skilled craftsmen at Ford's, enrolling only workers employed in manufacture of tools, dies, jigs, fixtures, gages and machinery. The union already claims 100 members in the Ford plants.

Sloan and Knudsen Upped In General Motors Shift

The General Motors directorate approved sweeping changes in the high command of the organization, early last month, which emphasize the division of responsibility between operating and financial policies of the organization and diminish the active participation of duPont-Morgan interests in the executive affairs of the Number One automobile manufacturing organization of the world.

The move elevated Alfred P. Sloan, Jr., president of the corporation since May, 1923, to chairman of the board, with Donaldson Brown, former chairman of the finance committee, as vice-chairman of the board.

William S. Knudsen, executive vice-president of the corporation, and prime negotiator in its recent dealings with the United Automobile Workers Union, was made president in a move which emphasizes the large part he has played in operating management of the corporation's recent expansion.

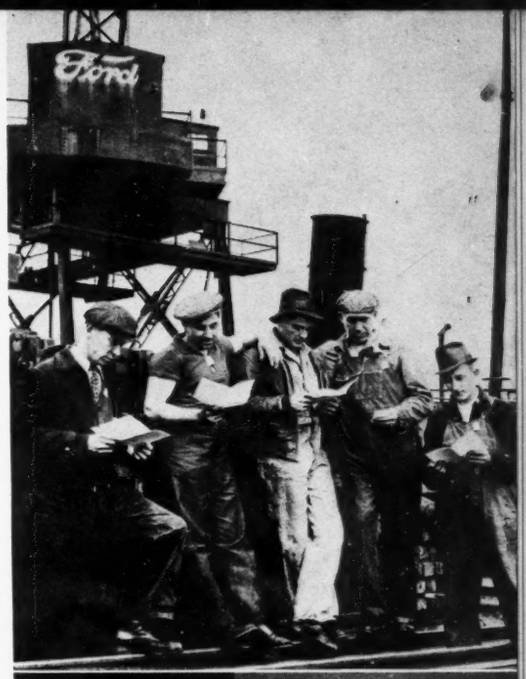
Down the Column:

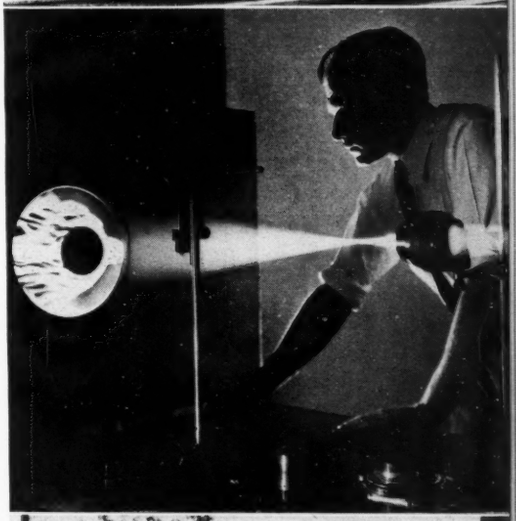
Workers Study Fordisms: Employes at the Ford plant at Detroit were given a list of Fordisms last month, which were brief excerpts from statements by Henry Ford in opposition to labor unions

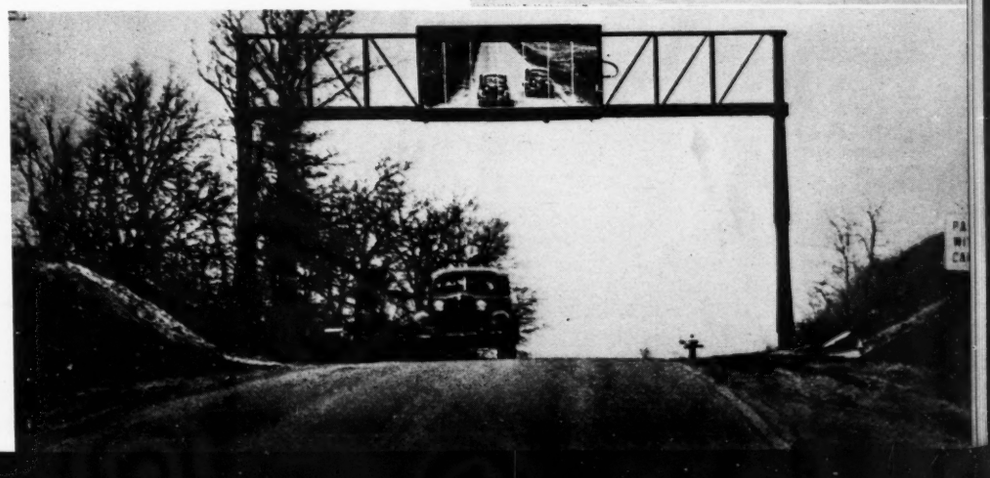
Streamline Study: Engineers in the General Motors Research Laboratories are able to study, visually, the flow of air around scale models with this device. Innovations developed primarily to stress beauty and eye appeal also result in lower wind resistance, better fuel economy and safety

Front-drive Scooter: A new development by George Wacker, engineer. It is driven by a two stroke engine, from the front wheel through a clutch and two speed gear

Trafficscope: Motorists can now see over hilltops with this device tested last month. It creates a mechanical mirage and lifts unseen approaching cars into the driver's vision







Depreciation

What It Is and How You Can Provide For Future Replacement of Tools and Equipment

Depreciation is the rat that gnaws away a chunk of your profits every year—unless steps are taken to prevent such losses.

It represents the reduction in value of tangible assets which takes place with the passing of time. Such assets in your garage are shop equipment, tools, office furniture, etc. Good business management dictates that depreciation be recognized as an operating expense to be charged off regularly every month, and "paid" like any other expense such as rent, light, heat or taxes. Too often this is overlooked and when the time comes for replacement of such assets the garageman finds a bare cupboard in his bank account. Yet providing for depreciation of assets by setting aside small amounts of cash regularly, is like providing life insurance for equipment and tools when they wear out or become obsolete.

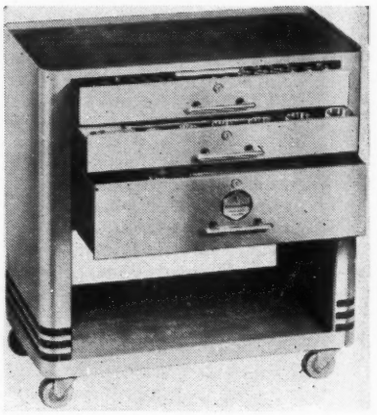
While it is important that depreciation costs be determined, as a matter of accurate bookkeeping, it is still more important that the money actually exist. Ofttimes, depreciation accounting consists largely of making pen-marks in the bookkeeping books. The right way is to see that the cash is set aside, "earmarked" for the specific purpose of replacing the old with new, modern units. The depreciation money should be put into a separate bank account or into gilt-edge securities.

If this policy is followed, depreciation reserves are really "reserves" as the money shown on the books is actually available to take care of depletion of assets.

These assets of yours—shop equipment and tools, especially—provide your future bread and butter. They wear out and become obsolete, can't handle newer cars. Your future profits depend on whether you are able to provide for their replacement. To measure depreciation of such assets, three elements must be taken into consideration: the cost of the unit, its working life, and the scrap or trade-in value when ready for replacement. Talk this problem over with your jobber or his salesmen. They will help you set up a correct depreciation figure on any or all of your shop equipment. Then plan to set aside a few dollars every week into a fund for replacement. It pays to "pay" depreciation expense.

Rolling Workshop

A portable cabinet-workbench combination has been introduced by the Blackhawk Mfg. Co., 5325 W. Rogers St., Milwaukee, Wis. The welded



steel cabinet is 33 in. high, 30 in. wide and 16 in. deep. Contains three drawers which slide on rollers and have built-in locks. Black ribbed-rubber matting in drawers and trays prevents tools from rattling and marring finish. Drawers have subdivided interiors for keeping sockets and handles in order. Supplied complete with assortments of 70, 80, 90 or 100 selected tools. An attractive and useful piece of equipment.

Down the Column:

***Devil and Pirate:** Barney Oldfield, oldtime daredevil, met this modern pirate at the Golden Gate Bridge, San Francisco, shortly before its opening last month. She is Vee Cunnam, pirate girl of the 1939 Golden Gate International Exposition

Pearcing Reminder: Al Pearce, Ford funster, displays his combination license plate and radio time table, awarded to him in the State of Michigan. The plates bear the number and letters "9 P. M. C. B. S."

Step on it, Sonny: Victor Levand, Philadelphia garageman, has a very young assistant who likes to keep himself busy about his father's shop. Sonny Levand is a good salesman, too

Gasoline Tax Bill Has Doubled Since 1929

Motorists of the United States are paying twice as much money in the form of gasoline taxes into the state and federal treasuries as they did in 1929, according to authoritative reports.

Although 1929 was the first year in which state gasoline taxes for the country as a whole equaled motor vehicle registration fees, so generally have gasoline tax rates been increased during the past few years that state gasoline levies now cost the motorists almost twice as much as do motor vehicle registration fees. In 1936 state gasoline tax receipts totalled $691,420,000, or almost double the $359,783,000 collected by the states in motor vehicle registration fees.

Contest for Repairmen Only

"Win a Ford, Chevrolet or Plymouth 2-door De Luxe sedan!—or one of 6,442 other cash and gift awards," is the theme of a sensational Permite Products advertising campaign, directed to automotive mechanics throughout the United States and Canada by Aluminum Industries, Inc.

Automotive repairmen and mechanics can win these prizes by finishing in about 15 words, the sentence "I like Permite Replacement Parts because . . . ." The rules are simple and easy. "The label from the front end of a Permite Replacement Parts box should also be enclosed, as well as the name of your Permite Parts Jobber," reads the entry blank.

Only automotive repairmen are eligible to enter the contest.

Entry blanks for this contest may be obtained from Permite Jobbers. More details regarding the contest and helpful hints are included in a full page advertisement in this month's issue of this magazine.

Through a nation-wide warehousing system, augmented by an extensive network of jobbers, unmatchable high-speed service is promised repairmen on the complete line of Permite Replacement Parts.

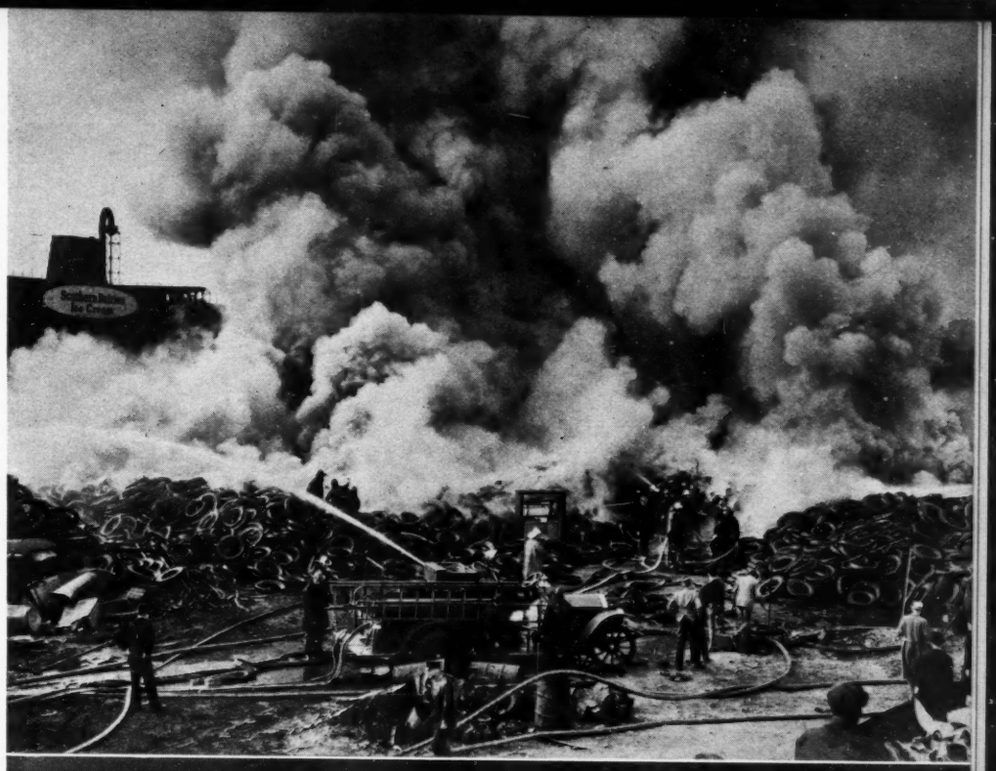
Any questions regarding this contest should be addressed to "Contest Manager," Aluminum Industries, Inc., Cincinnati, Ohio.

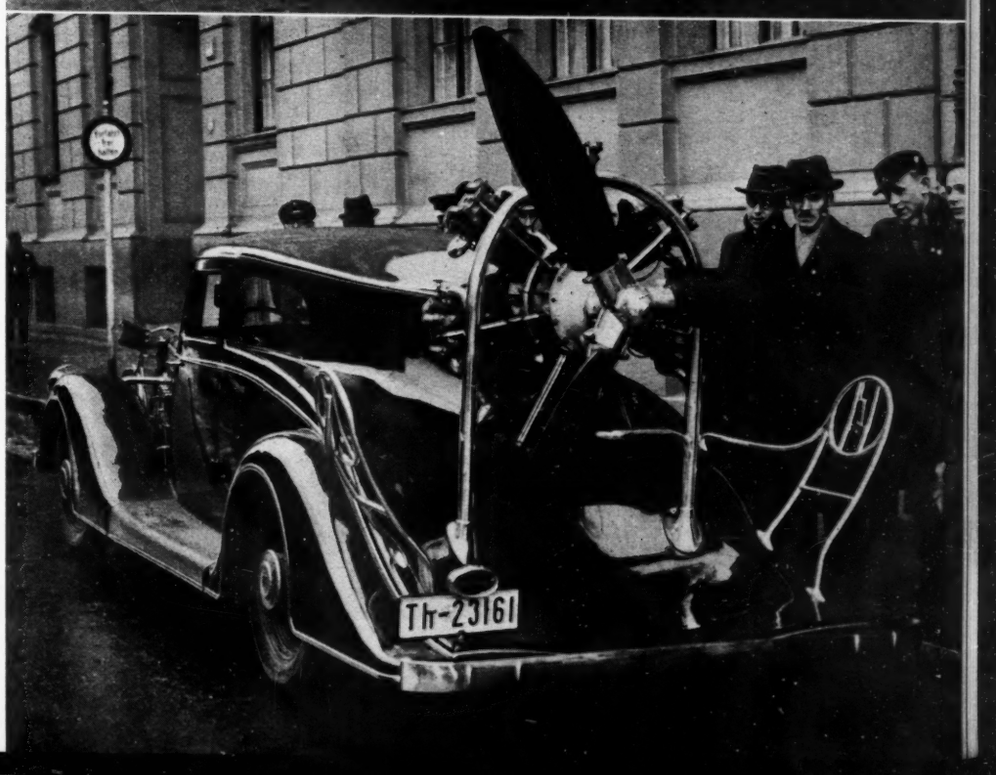
Down the Column:

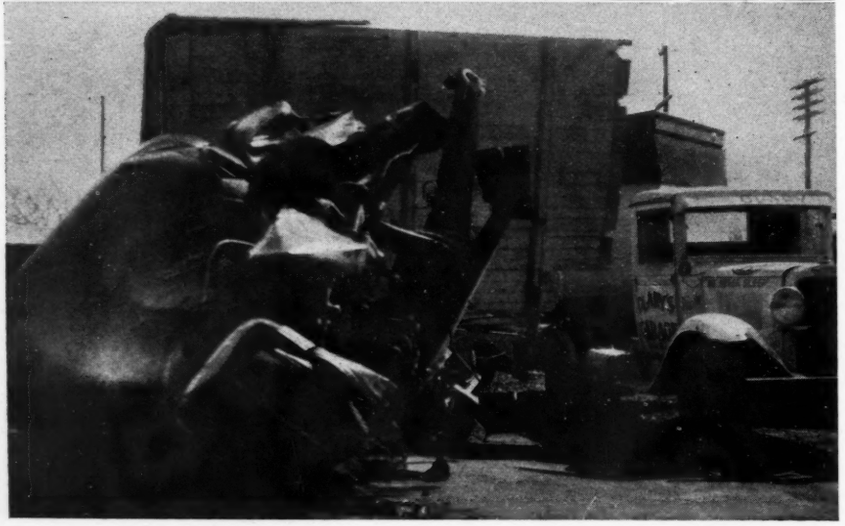
Tire Fire **Smoke got in everybody's eyes when fire broke out in a used tire yard in Washington last month. Firemen fought the blaze for several hours**

Giant **A view of the new Opel-Blitz developed by the Opel Works in Germany, showing the streamline exterior of this new bus**

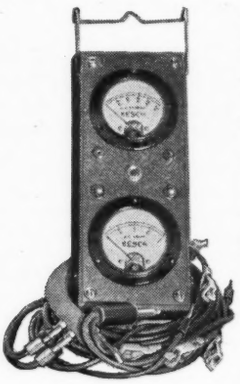
Combination: **Another German creation, an auto that can be driven on runners over winter's ice. Motive power is supplied by a propeller shown. Runners are removable**







Makes Primary Electric Tests



A new volt-amp tester for making all primary electrical tests has been announced by Besco Products, Inc., 7530 Greenwood Ave., Chicago, Ill. Tester employs precision, moving coil type of instruments, and can be purchased with a variable rheostat so that generator voltage can be raised to the point it should be to make proper tests. Model 705, illustrated, lists for $29.50.

$25,000 For Bendix Race

Total prize money for the 1937 Bendix Aviation race, to be held on Sept. 3, will total $25,000, it was announced recently by Herbert L. Sharlock, spokesman for Vincent Bendix. Of the total amount, $2,500 will be set aside for women pilots, $2,500 for the pilot who smashes the coast-to-coast record now held by Howard Hughes, and $20,000 for the Bendix race itself which begins on the West Coast and ends at Cleveland.

Among the expected entrants are Michel De Troyat, French ace, Col. Roscoe Turner, Cecil Allen, Keith Rider and probably Howard Hughes.

Pete De Paolo Joins Hastings

Peter De Paolo, internationally famous racing driver, has left Thompson Products, Inc., to join the field force of the Hastings Mfg. Co., Hastings, Mich.

Pete's first assignment with Hastings is to work with jobbers from coast to coast in holding clinic meetings for service men. As an added feature of the events, autographed copies of De Paolo's book, "Wall Smackers," will be given as door prizes.

Down the Column:

Fishermen The three pictures, from the top progressing downward, show three stages of "fishing out" a misguided taxi cab from the Potomac River, by the wrecking crew Call Carl, Inc., Washington, D. C., service station

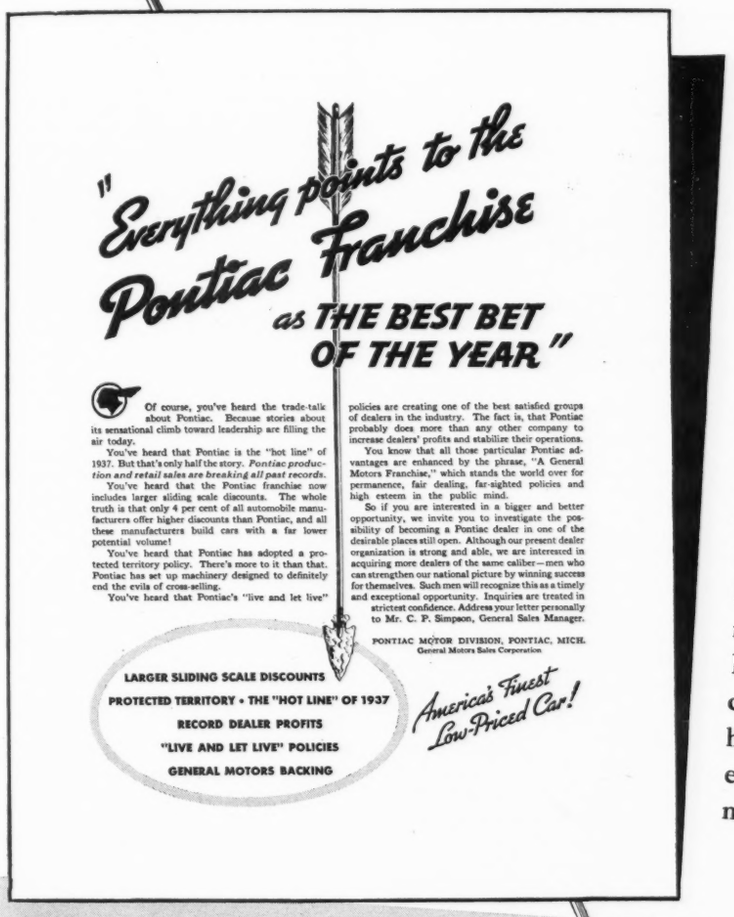
Miraculous Two men, one a two-hundred pounder, were in the cab of the truck (bottom photo) when it cracked up. So tangled was the wreckage that it took rescuers a half hour to extricate them. When G. M. O'Leary, of O'Leary's Garage, Inc., Henderson, N. C., finally got them out, he found them miraculously unscratched!

(These pictures were submitted by readers of Motor Age, at our usual rates)

Everything Points to the Pontiac Franchise as the Best Bet of the Year

A PREDICTION *in January*

A FACT *in June!*



"Everything points to the Pontiac Franchise as THE BEST BET OF THE YEAR"

Of course, you've heard the trade-talk about Pontiac. Because stories about its sensational climb toward leadership are filling the air today.

You've heard that Pontiac is the "hot line" of 1937. But that's only half the story. *Pontiac production and retail sales are breaking all past records.*

You've heard that the Pontiac franchise now includes larger sliding scale discounts. The whole truth is that only 4 per cent of all automobile manufacturers offer higher discounts than Pontiac, and all these manufacturers build cars with a far lower potential volume!

You've heard that Pontiac has adopted a protected territory policy. There's more to it than that. Pontiac has set up machinery designed to definitely end the evils of cross-selling.

You've heard that Pontiac's "live and let live" policies are creating one of the best satisfied groups of dealers in the industry. The fact is, that Pontiac probably does more than any other company to increase dealers' profits and stabilize their operations.

You know that all those particular Pontiac advantages are enhanced by the phrase, "A General Motors Franchise," which stands the world over for permanence, fair dealing, far-sighted policies and high esteem in the public mind.

So if you are interested in a bigger and better opportunity, we invite you to investigate the possibility of becoming a Pontiac dealer in one of the desirable places still open. Although our present dealer organization is strong and able, we are interested in acquiring more dealers of the same caliber—men who can strengthen our national picture by winning success for themselves. Such men will recognize this as a timely and exceptional opportunity. Inquiries are treated in strictest confidence. Address your letter personally to Mr. C. P. Simpson, General Sales Manager.

PONTIAC MOTOR DIVISION, PONTIAC, MICH.
General Motors Sales Corporation

LARGER SLIDING SCALE DISCOUNTS
PROTECTED TERRITORY • THE "HOT LINE" OF 1937
RECORD DEALER PROFITS
"LIVE AND LET LIVE" POLICIES
GENERAL MOTORS BACKING

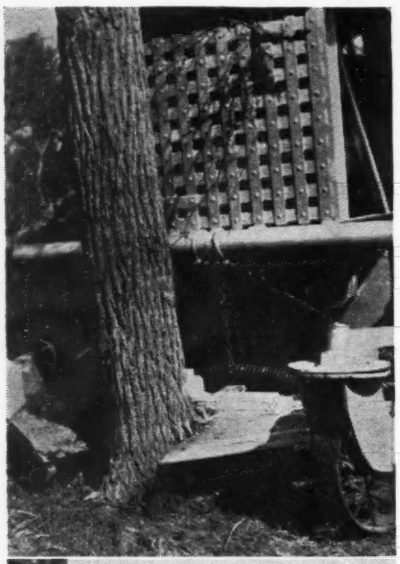
America's Finest Low-Priced Car!

In January, dealer enthusiasm for a new product and the liberal profit provisions of the Pontiac franchise gave birth to the prediction at the top of this page—"Everything points to Pontiac as the best bet of the year." By June 1st, the public's eager acceptance of this new product and the big returns actually accruing to holders of the Pontiac franchise had made that prediction a fact. March, to name but one example, was the biggest production month in Pontiac's 10-year history. And dealers of long standing are daily reporting the biggest net profits since their connection with Pontiac! Within this aggressive and successful operation, new dealer opportunities have recently opened up. To alert and energetic men, ambitious to forge ahead, nothing more need be said.

If you are interested in acquiring the Pontiac franchise, please communicate with C. P. Simpson, General Sales Manager, Pontiac Motor Division, General Motors Sales Corporation, Pontiac, Mich. Your communication will be regarded as strictly confidential.

LARGER SLIDING SCALE DISCOUNTS
RECORD DEALER PROFITS
PROTECTED TERRITORY•THE "HOT LINE" OF 1937
"LIVE AND LET LIVE" POLICIES
GENERAL MOTORS BACKING

When writing to advertisers please mention Motor Age



Willys Production 38,421

Showing a fourth consecutive monthly gain, and establishing a new monthly record with an output of 9819 cars in April, total output of 1937 Willy's models reached 38,421 units as of May 1.

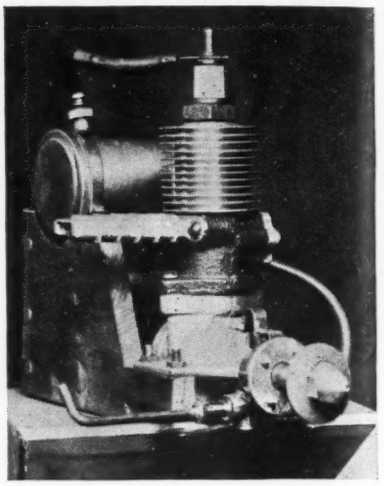
April production was 4.5 per cent greater than that of the preceding month which had been the record month since production of the new models began last fall.

The factory sales division reports all cars being shipped at the close of each day's manufacture, with advance orders still exceeding production schedules.

Twenty-three hundred dealers are participating in a nation-wide sales campaign calling for 1,000,000 Willys demonstrations in seven weeks. The dealers have been supplied with 2000 deluxe sedan models, with bright yellow bodies and green fenders, which are being used in the demonstration program to continue until June 7.

Meister Named Hyatt G.M.

H. O. K. Meister, new general manager of the Hyatt Bearing Div. of General Motors at Harrison, N. J., has been appointed to that office to succeed the late H. J. Forsythe.



MODEL aircraft engines are being made in Japan for export with the United States as the major market. The one shown is intended for a model airplane with a five foot wing spread. Its single cylinder has a bore of 0.74803 in. and a stroke of 0.86614 in. Engine speed is from 1000 to 2500 r.p.m. It is rated at 1/6 to 1/5 hp.

Rohde, Champion Spark Plug Chief Engineeer, Dies After Speedway Accident

Otto C. Rohde, 49, vice-president and chief engineer of the Champion Spark Plug Co. who was struck by the racing car of Overton Phillips, Middletown, N. Y., when it crashed into pits at Indianapolis, May 28, died, June 3, in City Hospital in Indianapolis. He had suffered a fractured skull and other injuries. Pneumonia complicated his injuries.

Mr. Rohde, with George Warford and Anthony Caccia, mechanics, were testing spark plugs on the Vern Orenduff car standing at the pits, when a car driven by Overton Phillips on a practice lap apparently broke its crankshaft and skidded toward the pits. An explosion followed by fire occurred as the flaming car crashed into the Orenduff car on which Rohde, Warford and Caccia were working. The flames demolished both cars. Warford died in the hospital admission room. Rohde, Phillips, Walter King (who was riding with Phillips) and Caccia were all reported seriously injured.

Rohde had attended every 500-mile race at Indianapolis in his 22 years' service with the Champion Spark Plug Co. He was a graduate of University of Michigan and chairman of ignition division of the Society of Automotive Engineers.

Another fatality occurred the same day, when the car in which Frank McGurk was qualifying, spun on the southwest turn ending in the infield. Albert Opalko, riding with McGurk at the time, was killed. McGurk was taken to the hospital, his condition reported serious.

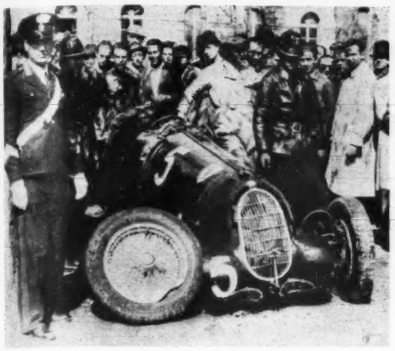
Down the Column:

Snip, snip and the whole tree falls. A close-up showing the "tree scissors" invented by Kirk Knight of Bartlett, Tex., at work. This device is mounted on the front of a tractor and when it hits a tree the jaws bite through the tree trunk

Jaywalkers' Signal designed for pedestrian traffic. The idea is to allow auto traffic to proceed uninterruptedly and when the pedestrian desires to cross the street he stops traffic with the signal. Practical jokers: not wanted. And, we wonder what happens to cross-town traffic?

Angel's-eye view Looking down from up above at Atlantic Stadium, Los Angeles, we get a quick glimpse of a couple of midgeteers attempting to negotiate the same turn at the same time. Incidentally, both boys made it

Foreign Racing News



Nuvolari's Wreck

Tazio Nuvolari's much publicized "contract with the devil" was renewed recently when he again healed quickly from racing injuries and current prospects are that last year's Roosevelt Raceway Vanderbilt Cup winner will return to the United States for the summer's Long Island competition.

Injured when his car turned over during practice for the Turin circuit race held at Valentino Park in Italy in April, Nuvolari healed sufficiently to compete in the annual Grand Prix of Tripoli on May 9. Immediately following the Turin accident, the Italian ace was reported to be in a "critical" condition. However, he was on deck for the Tripoli classic at Lybia, North Africa, less than a month later. Effects of the crash were evident in the Tripoli Grand Prix when Nuvolari withdrew at the fifth 8.14-mile lap after engine trouble had twice sent him to the pits.

Recent casualties in Europe also numbered Lord Earle Howe, another foreigner prominent in the George Vanderbilt Cup race last October. Lord Howe, who finished thirteenth at Roosevelt Raceway, broke a shoulder and several ribs when his car turned over during the race at Brooklands May 1. The British driver is reported back on the active list at this time.

The Tripoli race, in which Nuvolari got back into action for the first time, was won by Herrmann Lang of the German Mercedes-Benz team who established a new record of 134.412 m.p.h. for the 325.561-mile race. The previous record was 129.61 m.p.h. established last year by Varzi of the German team in an Auto-Union.

Although an invitation had been extended to the United States for three top rank drivers to compete at Tripoli, there were no takers and the Americans were out of the Tripoli picture for the second straight year. The last American entries went over in 1934 when Pete DePaolo and Lou Moore flew the star and stripes.

---

100 Mechanics on Strike at Wilmington, Del.

Objecting to a flat rate scale and asking for a four-year training period as the basis of the apprentice system, more than 100 automotive mechanics and maintenance workers, employed in five motor sales and services companies of Wilmington, Del., are out on strike. The strike went into effect suddenly on Monday, May 24. The men who went out on strike are members of the Auto Maintenance Men's Local No. 1226 of the International Association of Machinists, affiliated with the American Federation of Labor. Wage, hour and closed shop agreements are sought by the union.

Members of the Delaware Motor Trades Association at a special meeting appointed a special committee to study wages, hours and working conditions in garages "to determine rates that shall be satisfactory to employes and customers." The committee is also endeavoring to settle the strike, as MOTOR AGE goes to press.

William D. Luke, president of the Delaware Motor Trades Association, said that the walkout was called without any warning having been given to dealers or independent service station operators.

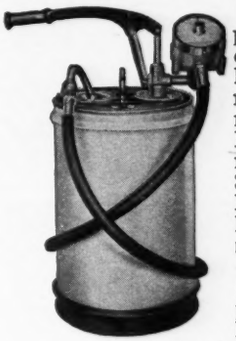
"Many union members," Mr. Luke said, "had expressed themselves as feeling that a strike at this time was inadvisable because the employers had not been given ample opportunity to acquaint themselves with the objects of the local and its members.

"Last Friday (May 14) I informed the president of the local that I would bring before the trades association meeting the grievances of the members of the local. Despite this, the strike was called."

Illustrated Catalog Free

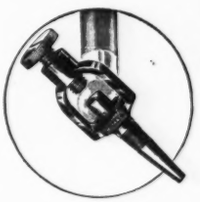
An attractive catalogue on the new 40 volt Simplified Electric Arc Welding has been compiled by Hobart Brothers. It contains many illustrations of the various jobs this new welding can handle,, as well as the complete description of the line, specifications, etc. It will be sent upon request to any of our readers. Write Hobart Brothers Company, Box FR-173, Troy, Ohio.

Lincoln Offers Hand Operated Gear Lubricator

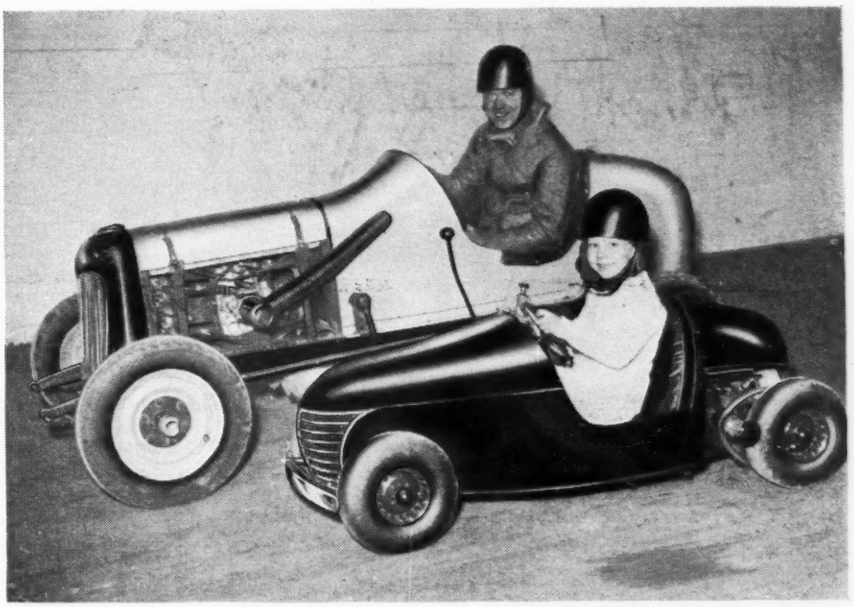


A 50-lb. capacity hand operated gear lubricator is a new item announced by the Lincoln Engineering Co., 3458 N. Union Blvd., St. Louis, Mo. This new model meets the demand for a moderately priced yet highly efficient unit. It is ideal for handling hypoid lubricants. Equipped with Lincoln Junior Meter graduated in pints and quarter-pints, 5½ ft. volume hose and non-drip nozzle, and finished in white enamel with red and black trimming.

Air Nozzle Fits Standard Chuck



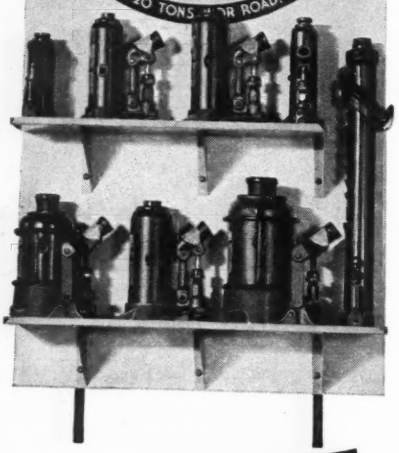
A new air nozzle to fit a standard air chuck has been announced by Rinck-McIlwaine, Inc., 16 Hudson St., New York City. When the screw is tightened it blows a fine strong air stream. A quarter turn of the screw stops it. Can also be used as a coupling, as the end is threaded with ⅛ pipe thread. List price $.50 each.



Miniature Midget: This little midget, a vest-pocket job, compared with Jimmy Snyder's (the same record-breaking, big-car Jimmy), was designed and built by M. Mallory, president of Mallory Electric Corp., Detroit, makers of Mallory Ignition Equipment. Complete in every detail, the tiny car is powered by a single-cylinder, air-cooled engine. Driven by seven-year-old "Boots" Mallory, son of the equipment manufacturer

FOR EXTRA VALUE...
RIGHT PRICES AND
Unexcelled Performance
Go where you See this display

Here They Are!
WALKER
HYDRAULIC JACKS
CAPACITY FROM 1½ TO 20 TONS FOR ROAD, SHOP & BENCH SERVICE
Features: • Automatic Safety Valve • Removable Oil Filter Screen • Centered Pump and Handle Socket • Many Other Exclusive Qualities



ASK YOUR JOBBER
about Walker models for heavy-duty shop or bench service with oil line control knobs, adjustable carrying handles and other features.

ASK YOUR JOBBER
about Walker Hydraulics for lifting cars, trucks and buses with exclusive advantages that provide maximum ease, speed and safety.

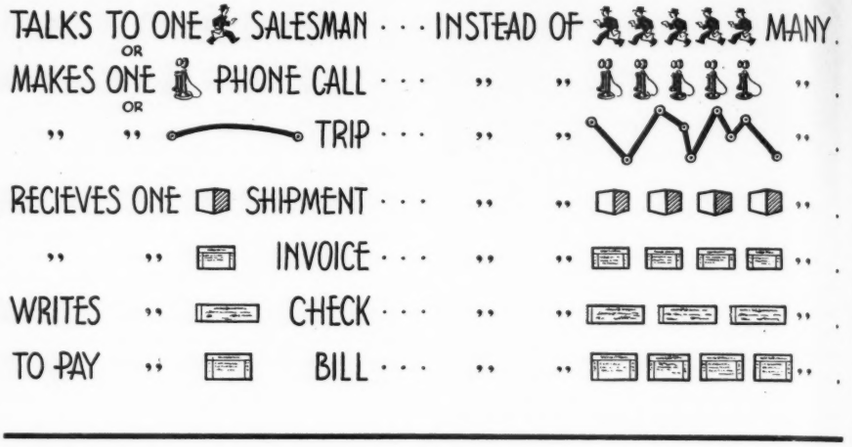
• WALKER
HYDRAULIC PRICES
1½ ton, $3.30; 1½ ton bumper jack, $5.60; 2½ tons, $6.65; 3½ tons, $8.50; 5½ tons, $10.50; 7½ tons, $14.00 and $15.00; 12 tons, $21.00; 20 tons, $35.00 and $38.00.

All prices dealer net, slightly higher west of Denver and in Canada.

WALKER MANUFACTURING CO., Racine, Wis.

WALKER
Hydraulic
JACKS

Reasons Why: **Al Laansma, Editor of *Motor World Wholesale*, has designed a series of animated charts showing reasons why you should buy from your jobber. This chart, entitled "Complete Stocks," points out that all makes of cars can be serviced *at once* from the jobber's stock. That saves time, work, annoyance and money for the repairman because he . .**


TALKS TO ONE SALESMAN · · · INSTEAD OF MANY.
OR
MAKES ONE PHONE CALL · · · " "
OR
" " TRIP · · · " "
RECIEVES ONE SHIPMENT · · · " "
" " INVOICE · · · " "
WRITES " CHECK · · · " "
TO PAY " BILL · · · " "

GM Forms Diesel Division

The formation of a new division, to be known as the Diesel engine division of General Motors Corp., has been announced by Alfred P. Sloan, Jr., president. The new division will manufacture a line of Winton Diesel engines, beginning with a 20 hp., single-cylinder unit up to a 160 hp., six-cylinder unit. Single-cylinder units are designed for stationary use only, whereas multi-cylinder units are adaptable to marine, stationary or commercial vehicle use.

The manufacture of Diesel engine fuel injectors which has been carried on in the General Motors research laboratories for the past seven years will be moved to the new plant, as soon as possible.

A 75-acre tract of land, located at the intersection of the Pere Marquette Railroad and Outer Drive, Detroit, has been purchased and erection of a new plant will be started at once. The first building to be built will be an engineering laboratory in which all development and test work on Diesel engines for Winton Engine Manufacturers Corp. and Electro-Motive Corp., as well as for the new division, will be carried on. This laboratory will also contain a Diesel-electric power plant for supplying all power to the manufacturing plant. Heating requirements will be supplied through an electrically-heated boiler absorbing current from the test dynamometers.

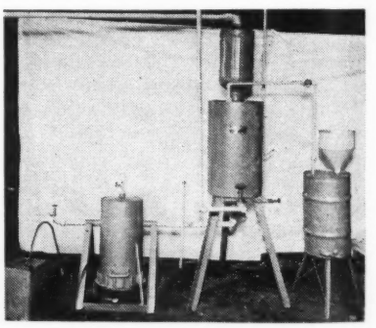
W. T. Crowe has been appointed general manager of this division. The appointment of other officials will be announced later.

N. Y. Maintenance Show

Several thousand jobbers and retailers attended the first metropolitan automotive maintenance show, held in the Commerce Hall of the Port Authority Building in New York, April 22.

Re-refines Oil

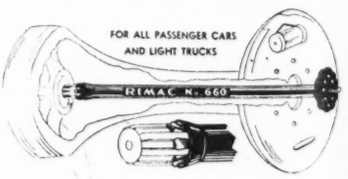
The Champion Oil Re-refiner, a product of Honeycutt Mfg. Co., 2715 Oak St., Kansas City, Mo., offers an additional avenue of profit by re-refining oil drained from crankcases.



Carefully designed to do the job right, the machine has a capacity for handling 5 gallons per hour, at an operating cost of 1½ to 2½ cents per quart, according to the manufacturer. The Re-refiner occupies 2 sq. ft. of floor space, and operates from 110 volt AC circuit. For complete information write the manufacturer.

Puller for Broken Axle Shaft

A new tool known as Axle Stub Puller No. 660 has been developed by Rinck-McIlwaine, Inc., 16 Hudson St., New York City. Inserted in the



axle housing, six tempered spring steel jaws bite into the stub of the axle as the handle is tightened, enabling the broken shaft to be withdrawn without further disassembly.

THE BOSS *Lays Down* THE LAW

1 FROM NOW ON, YOU FELLOWS MUST PUT MORE STUFF ON THE BALL--- CUSTOMERS ARE SLIPPIN' AWAY-- AND THAT'S GOT TO STOP.
O.K., BOSS--BUT WE CAN'T TURN OUT JOBS ANY FASTER WITHOUT MORE JACKS
2 I'VE FIXED THAT. WE'RE GETTING NEW WALKER ROLL-A-CARS--- THERE'LL BE A JACK FOR EVERY ONE OF YOU.
WELL, THATS WHAT WE NEED TO PUT ON SPEED.
3 LATER
WE'VE GOT THE BEST EQUIPPED SHOP IN TOWN--AND OUR BUSINESS SHOWS IT.
YOU BET--WE'RE GETTIN' A LOT OF NEW CUSTOMERS.

Long, low-to-the-floor chassis is streamlined to duck under anything—and power raise from 3¾" to 24" gives plenty of working clearance under any car.

HYDRAULIC
MODEL No. 785
Capacity 3¾ tons

Many exclusive Walker features contribute to the operating ease, speed and safety of this Walker hydraulic. See No. 785.

● You've got to have jacks—at least one good jack for every mechanic—to make money in automotive service today. For most efficient service you need Walker Roll-A-Cars. They're built for modern cars—all cars. The low chassis rolls under without interference—and long handles give you plenty of reach. Roll-A-Cars are balanced for easy positioning. They start low, lift fast and plenty high to put a car up where you can work on it. Hydraulic and mechanical models for cars, trucks and buses. See them at your jobber's.

WALKER ROLL-A-CAR MODELS AND PRICES FOR EVERY NEED

Hydraulic Types		Mechanical Types	
No. 774—2 tons	$41.00	No. 743—2 tons	$34.00
No. 785—3¾ tons	59.50	No. 745—2½ tons	38.50
No. 780—10 tons	125.00	No. 760—6 tons	97.50

All prices dealer net Eastern U.S., slightly higher west of Denver and in Canada

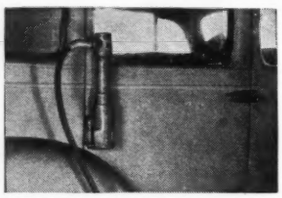
WALKER MANUFACTURING CO., RACINE, WIS.
Makers also of Walker Electric Lifts and Exhaust Silencers

WALKER
Roll-A-Cars
PUT PROFITS IN SERVICE

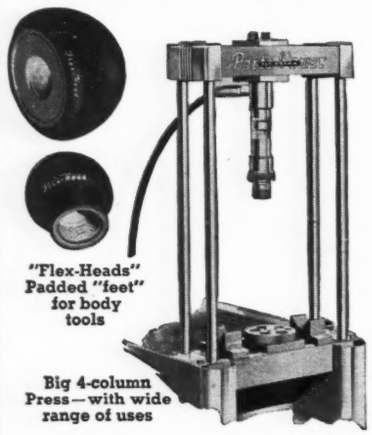
"I'M AS HANDY AS A SCREW DRIVER" says Porto-Power

HYDRAULIC POWER
ready for a thousand jobs in garages—body shops—service shops

Easy to remove perch bolts



Out come stubborn hinge pins



"Flex-Heads" Padded "feet" for body tools

Big 4-column Press—with wide range of uses

Porto-Power is the handiest, most profitable outfit any shop can have for hundreds of those "pesky" jobs that usually take double the time you have figured on.

BLACKHAWK MFG. CO.
Dept. MA-6 Milwaukee, Wisconsin

SEE OPPOSITE PAGE

BLACKHAWK

Splattered Teardrop: Even the ultra-modern three-wheeled teardrop car, used for advertising purposes, wasn't excepted from the "immovable body-irresistible force" theory when it crashed near Gorman, Calif., recently. Photo shows remains of splattered teardrop.

LAC-O-RUB Compound for Refinishing Cars

A high speed, scientifically prepared rubbing compound, known as LAC-O-RUB, has been developed by the J. A. Tumbler Laboratories, 423 Hanover St., Baltimore, Md. It is made especially for rubbing down and refinishing lacquered and enameled finishes, and is intended for refinishing shops or for new and used car dealers who want a fast and safe compound to use in connection with used car reconditioning.

Included in the list of products manufactured by the J. A. Tumbler Laboratories are Haze Remover, Liquid Wax, Brilliant Polish and Hydegre, a degreasing preparation.

Ethyl Expansion

A $1,000,000 expansion program is under way at the Ethyl-Dow Chemical Company's plant for recovery of bromine from the sea at Kure Beach, near Wilmington, N. C. Capacity will be doubled, and the annual output of ethylene dibromide will be stepped up to 20,000,000 pounds to keep pace with the world demand for Ethyl fluid, used in the production of antiknock gasoline for high compression motors.

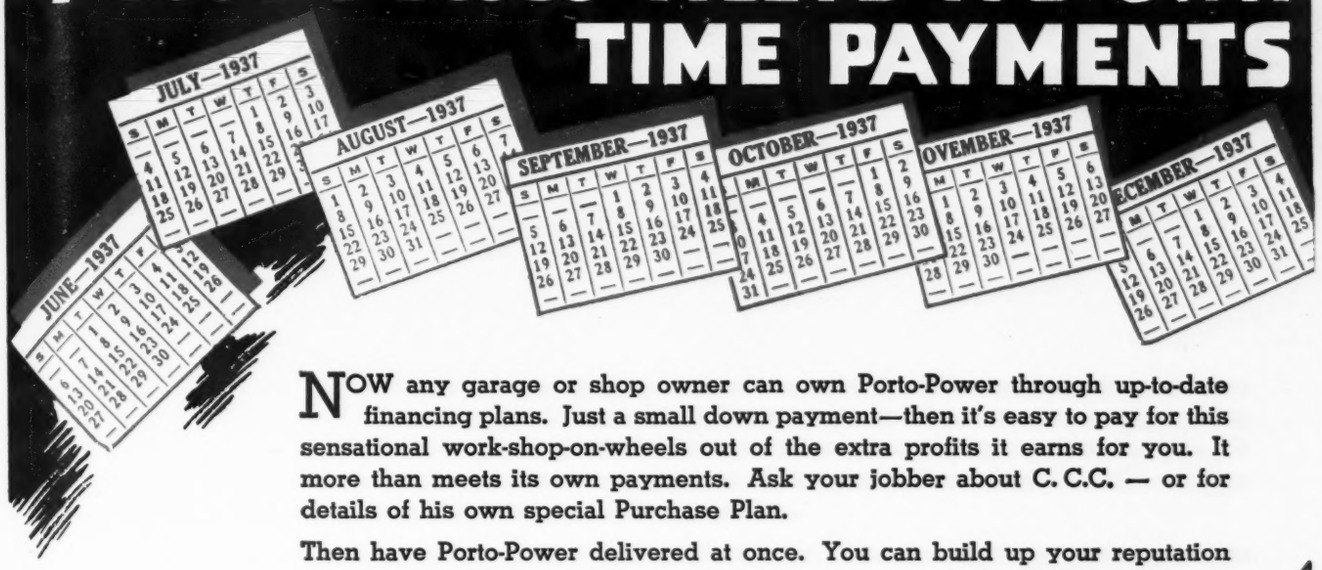
Unique in industrial civilization, and the first to exploit the mineral resources of the ocean on a commercial scale, the plant, when construction is completed on July 1, will be enabled to draw 137,000 gallons of water from the sea a minute, a volume great enough to meet the drinking water requirements of two cities the size of New York, allowing each inhabitant ten gallons daily. Approximately 2000 gallons of seawater must be treated to obtain one pound of bromine. Ethylene dibromide, which is 85 per cent bromine, is added to tetraethyl lead, the antiknock factor, to be mixed with gasoline.

Box Score of Race

The "box score" of the 500-mile Indianapolis race showing the relative position of the ten leaders at 50-mile stages of the long grind.

Car No.	Driver	50 Miles	100 Miles	200 Miles	250 Miles	300 Miles	350 Miles	400 Miles	450 Miles	500 Miles
2	L. Meyer	4	3		10	6	6	4	4	4
3	Horn		8	3	3	3	2	3	3	3
5	J. Snyder	1								
6	Shaw	3	1	2	1	1	3	2	1	1
8	Hepburn	5	4	1	2	2	1	1	2	2
16	Cummings		6	4	4	4	4	6	6	6
17	Connor					8	9	8	7	9
25	Petillo				8					
26	Willman			9						
28	De Vore					7	7	7	8	7
31	Gardner		10	8						
32	Davis			10						
33	Swanson		5							
34	Cantlon			7						
35	Litz						10	10	9	
38	Gulotta		9		9	9	8	9	10	8
45	Bergere		7	5	5	5	5	5	5	5
53	Tomei									10
54	Ardinger	2	2	6	6					
62	F. Roberts				7	10				

Porto-Power MEETS IT'S OWN TIME PAYMENTS



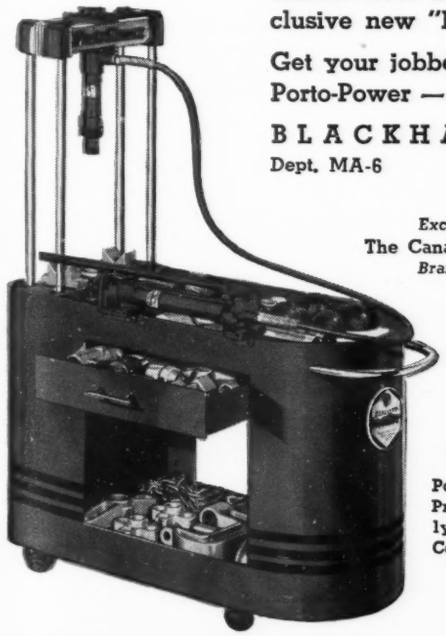
NOW any garage or shop owner can own Porto-Power through up-to-date financing plans. Just a small down payment—then it's easy to pay for this sensational work-shop-on-wheels out of the extra profits it earns for you. It more than meets its own payments. Ask your jobber about C. C. C. — or for details of his own special Purchase Plan.

Then have Porto-Power delivered at once. You can build up your reputation for modern service — bring in more business — with the S-100 model on the job. Toughest jobs become "softies" when Porto-Power goes to work. Frame and axle work, body repairs, straightening, bending, pressing, pushing — and hundreds of other time-eating jobs are all the same to the S-100. Big 4-column press, remotely controlled all-directional 7-ton hydraulic ram, streamlined welded-steel stand with rubber-matted steel drawer and accessory tray — equipped with exclusive new "Flex-Heads" and other advanced accessories.

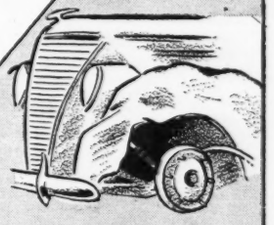
Get your jobber salesman to demonstrate the new S-100 Porto-Power — and send for FREE book "Crash Profits."

BLACKHAWK MFG. COMPANY
Dept. MA-6 MILWAUKEE, WISCONSIN

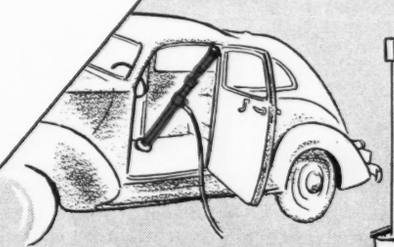
Exclusive Canadian Distributor:
The Canadian Fairbanks-Morse Co., Ltd.
Branches in All Principal Cities



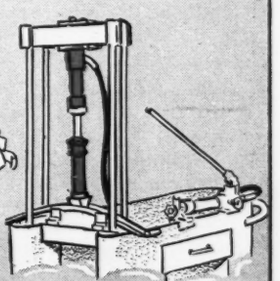
MODEL S-100
Porto-Power. Dealer Price $195.75. Slightly higher on West Coast and in Canada.



Quick set-ups iron out crumpled or bashed-in fenders in short order.



Porto-Power, with extensions and attachments, handles scores of body and panel jobs.



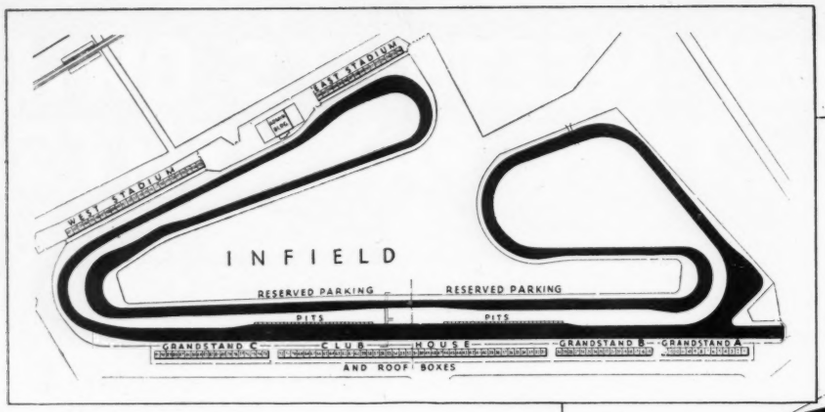
Bumper work is "easy as pie" for Porto-Power.

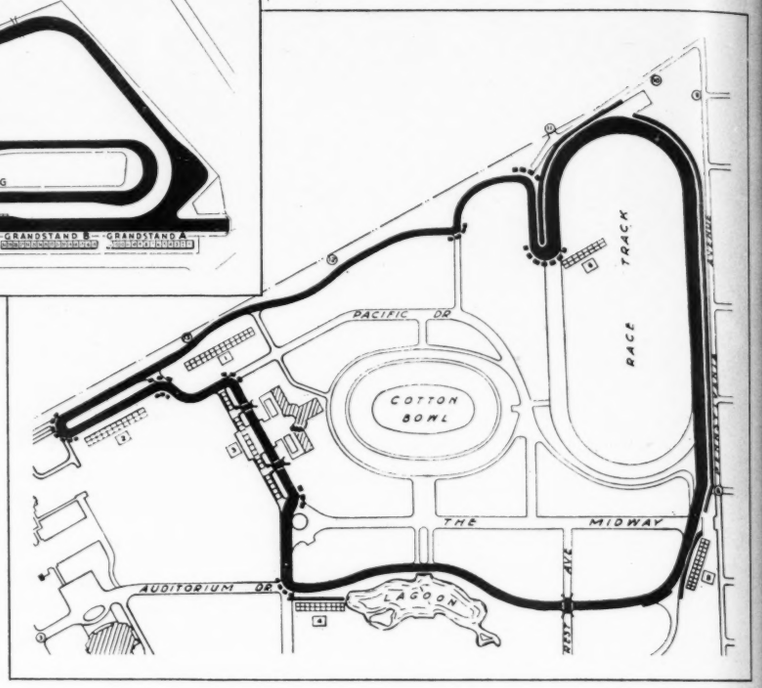
AUTOMOTIVE EQUIPMENT TIME PAYMENT PLAN

BLACKHAWK Porto-Power

See opposite page

BLACKHAWK Porto-Power





New Racing Styles: **With the revisions made at the Roosevelt Raceway, Westbury, L. I., and with the announcement of a 300-mile Road Race, at the Pan-American Exposition Grounds, Dallas, Tex., Aug. 1, American drivers must prepare themselves for new designs in auto racing. Above is the revised Roosevelt Raceway. Right, is the circuit laid out for the 300-miler at Dallas**

Vanderbilt Cup Race July 3; Track Improvements Made

With the George Vanderbilt Cup classic at Roosevelt Raceway, Westbury, L. I., moved up two days to July 3 (July 5, now being the rain date), big league automobile racing harkens back to the board speedway era when "overnight" jumps from one major classic to another were prevalent.

It has been nearly ten years since the topnotch drivers climaxed their strenuous Indianapolis grind of Memorial Day with immediate preparations for another rich event within the short space of weeks. Such a condition has not been apparent since the mile and a quarter board speedway at Altoona, Pa., attracted the Indianapolis stars with their same expensive mounts in mid-June for the annual Flag Day classic of 250 breath-taking miles.

Another important change is a drastic alteration of the track design. Work being fast completed at the Raceway eliminates the center loop of the pretzel course and the resultant elimination of a number of tricky curves which slowed the Vanderbilt race of last fall to 65 miles per hour. The new design provides two long straightaways parallel in front of the clubhouse stands and joined at each end by a wide loop. The surface also has been improved to eliminate unnecessary skidding which tended only to lessen the thrills at the inaugural event last year. Speed veterans have gone on record that the Vanderbilt event July 3 will far outpace the initial classic last fall and that the average gait for the 300 miles will be increased by some thirty miles per hour.

Repairman's Visit To The

FACTORIES

Thompson Acquires Jadson

Thompson Products, Inc., Cleveland, has acquired the assets and business of the Jadson Motor Products Co., Bell, California, according to an announcement by Fred C. Crawford, president of the Cleveland concern. The plant in California gives Thompson Products the advantages of complete manufacturing facilities on the Pacific Coast and is expected to improve service to replacement and original equipment customers in the West, a factory bulletin stated. The Jadson company will continue manufacturing and sales activities under its own name.

Chevrolet Promotions

C. W. Wood, Chevrolet national service and mechanical manager, has appointed Harry L. Shaw central office service development manager. Prior to his appointment, he was Los Angeles zone service and mechanical manager. Mr. Shaw succeeds Mr. C. M. Davenport, who was recently placed in charge of the Used Car Reconditioning Division of the Service & Mechanical Department.

Clark Joins Randall Graphite

M. E. Clark has been appointed sales manager of Randall Graphite Products Corporation of Chicago, manufacturers of Randall Graphite Bronze Bushings and Randall Pillow Blocks.

Spicer Joins Asbestos Mfg. Co.

The Asbestos Mfg. Co. announces the appointment of Donald H. Spicer as Assistant Manager of the Replacement Sales Division, effective May 1. Educated for engineering, Spicer put in six years with Johns-Manville in research and field work. For the past three years he has been with the Atlas Asbestos Company in sales management and administrative capacities. His headquarters will be in the general offices of the company at Huntington, Ind.

Carborundum Band Invited

The Carborundum Band, under the direction of Edward D'Anna and which has been heard over the air waves for the past eleven seasons, has been invited to appear at the Great Lakes Exposition at Cleveland. The celebrated band is scheduled to play two concerts on the afternoon and evening of July 24 which will be known as Carborundum Day at the Exposition. The concerts will be given in the mammoth band shell in what is known as Radio Land.

Bretzlaff Joins Defiance

W. Herbert Bretzlaff, for the past four years vice-president in charge of national account sales for E. A. Laboratories, has been appointed vice-president of the Defiance Pressed Steel Co.

43 to 1

43 to 1 - a somewhat mysterious headline perhaps, but one which, nevertheless, emphasizes an important point. This ratio represents the results of a test in which a journal of 2 in. diameter was run in a white metal bushing at 500 r. p. m. and 230 lbs. per sq. in. load. Oil was fed to the assembly until stable conditions of lubrication were obtained. The supply was then cut off and the bearing seized in 36 minutes. The experiment was repeated, but this time oil containing "dag" colloidal graphite was used. The journal ran for over 26 hours before tightening in the bearing was noted. This test indicates that graphoid surfaces, possessing low friction properties, will, for surprisingly long periods, safeguard against metal-to-metal contact during breaks in the lubricating film. Write for copy of Booklet 600 describing "dag" colloidal graphite.

Ask your oil supplier about his colloidal-graphited oils today

ACHESON COLLOIDS CORPORATION
PORT HURON MICHIGAN

REG U.S. **dag** PAT. OFF.

COLLOIDAL PRODUCTS

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COLLOIDAL GRAPHITE

"AG" COLLOIDAL GRAPHITE IS A 100% AMERICAN MADE MATERIAL

Flat Rate Prices On 1937 Studebaker

Models 5A—Dictator and 6A—Dictator Planar—6 Cylinder—1937

Starting Serial Numbers: { 5A—5,536,001 and 5,852,001 / 6A—5,255,001 and 5,802,001

3¼ in. bore x 4⅜ in. stroke. Piston Dis. 217.8 cu. in. A.M.A. Hp. 25.4

OPR.	LAB.	MAT.	MFR HR.
A			
1	$7.50	$0.60	N.O.
2	11.00	.60	3.6
3	3.50	N.C.	1.5
5-5A	6.85	4.00	2.5
6A	6.50	4.00	2.5
6	1.75	3.40	.6
7-5A	7.95	5.50	N.O.
6A	9.75	R 12.40	N.O.
7x-5A	3.00	5.30	1.2
6A	3.00	8.55	1.2
7y-5A	1.80	S.L.	.3
6A	See A 7x		
8	8.00	N.C.	N.O.
8x-5A	3.00	A.R.	.9
8y-5A	11.00	A.R.	N.O.
9-5A	2.25	1.50	N.O.
6A	4.50	R 8.40	N.O.
9x-5A	.90	N.C.	.3
6A	1.25	N.C.	.3
10-5A	1.00	.30	N.O.
11	3.50	N.C.	1.5
12	3.40	N.C.	1.1
13	1.50	N.C.	.6
14	6.75	S.L.	2.2
15	3.00	.20	1.3
16	1.25	S.L.	.5
17	2.00	N.C.	1.1
18-5A	1.00	N.C.	.5
6A	1.50	N.C.	.7
20	3.00	7.90	.9
21	2.00	2.70	.6
22	1.25	1.90	.3
23	R 2.00	.95	.5
B			
1	3.00	2.50	1.0
1x	.90	.30	.4
3	1.50	N.C.	.7
4	2.75	.20	2.0
6	.90	N.C.	.4
8	3.75	1.00	N.O.
8c	1.35	1.75	.4
8f	4.25	2.70	N.O.
10	4.50	2.50	N.O.
13	7.50	5.20	4.0
13a	1.25	5.00	N.O.
13y	25.50	....	N.O.
14	1.50	.20	N.O.
15	1.50	4.50	.6
16	1.50	N.C.	.6
17x	1.25	1.00	.6
18	2.75	1.05	1.1
18x	1.25	5.00	.7
18y	1.75	.30	.8
19	3.00	.70	N.O.
19a	2.75	.70	N.O.
19b	1.45	.70	N.O.
20	1.55	3.50	N.O.
20a	1.10	3.50	N.O.
21	15.75	4.85	N.O.
21a	12.00	4.85	N.O.
22	1.00	1.00	.6
C			
2-5A	R 4.00	32.50	1.0
6A	R 5.00	32.50	2.1
3-5A	$6.00	$20.10	2.5
6A	7.00	20.10	2.5
3x	2.50	11.60	N.O.
4x	.75	1.85	.3
5	.50	....	.3
6	.60	....	.3
7	.50	....	.3
7x	1.50	....	.4
8	.50	1.25	.2
10x	.75	.75	.3
11	1.50	.10	.5
12	3.00	S.L.	1.4
13	.90	.25	.2
D			
2x	1.50	.45	N.O.
3	1.75	.60	.9
4	.80	.10	.3
6	.75	.10	.4
7	2.00	.35	.9
7x	3.60	....	N.O.
7y	2.25	5.10	.9
8x	.75	N.C.	.3
8y	1.00	2.75	N.O.
9	3.25	N.C.	1.6
10	1.25	N.C.	N.O.
11	.50	.05	.1
11x	1.75	....	.4
12	1.50	3.85	.4
13	.75	2.00	.3
15	2.25	7.35	.9
16	1.50	1.95	.5
E			
1	87.50	S.L.	N.O.
1a	4.00	....	1.1
2	51.50	S.L.	N.O.
3x	27.85	15.45	N.O.
4	26.50	7.80	N.O.
5	24.65	11.90	R 7.2
F			
1	14.00	1.50	7.1
3	58.00	61.20	R 21.3
H5	8.25	3.00	R 3.4
5	9.45	3.00	R 3.9
5x	11.45	3.30	N.O.
5y	19.20	3.90	N.O.
6	4.75	.40	1.5
9	2.00	.40	N.O.
10	3.00	.85	.9
13	2.25	2.15	1.0
15	1.80	S.L.	.4
17a	3.75	N.C.	N.O.
18	2.00	.30	.6
19	.60	.10	.2
20	.75	1.50	.2
G			
1	15.90	10.65	N.O.
2	1.35	7.65	.7
2a	.25	1.30	N.O.
3	11.10	10.65	4.1
5	12.75	6.55	4.5
6	14.10	14.20	5.2
7	.50	.65	.2
8	$17.55	$6.55	N.O.
9	3.00	3.55	1.1
10	18.90	14.20	N.O.
10a	6.75	8.65	N.O.
11	11.40	8.65	N.O.
13	4.90	5.65	R 1.2
14	33.90	36.90	N.O.
H			
1	8.25	3.00	R 3.4
1x	5.75	3.00	R 1.9
1a	2.75	2.15	R 1.2
1b	3.50	.85	R 1.0
2	1.50	N.C.	.4
2a	.25	N.C.	N.O.
3	5.40	N.C.	N.O.
4	7.65	2.15	N.O.
5	8.00	6.35	2.5
5x	2.80	3.35	N.O.
5a	.90	N.C.	N.O.
6	8.40	19.75	N.O.
7	1.80	N.C.	.4
K			
1	5.00	8.45	N.O.
5	8.40	28.30	N.O.
6	7.25	10.60	N.O.
8	40.30	71.90	N.O.
9	R 3.75	5.05	N.O.
10	R 1.50	2.90	N.O.
11-5A	R 5.00	.35	1.6
6A	6.00	N.C.	2.0
L			
1	R 12.25	1.40	4.2
1a	R 9.25	.75	N.O.
2	R 10.25	1.40	N.O.
3	5.40	4.20	3.6
4	.60	.35	.3
6	R 2.75	.25	.9
7	3.70	1.15	N.O.
7a	.50	.20	N.O.
8	1.20	1.45	N.O.
11	.60	.20	.2
M			
1-5A	R 8.00	.60	2.1
6A	R 9.00	.60	2.5
3-5A	R 9.50	.70	N.O.
6A	R 10.50	.70	N.O.
4-5A	R 8.90	8.10	2.4
6A	R 9.90	8.10	2.8
4a	.90	7.50	.3
4b-5A	2.40	7.75	1.4
6A	2.40	7.75	1.1
6	1.75	10.00	.8
7	9.20	1.65	N.O.
O			
1	Conv. .50	N.C.	.3
	O-D. .70	N.C.	.4
3	R 6.75	7.10	3.0
4	R 5.50	1.25	2.0
5	R 7.05	....	3.3
6	.30	....	.3
7	.60	.20	.4
8	R 9.05	S.L.	N.O.
9	R 10.00	S.L.	N.O.
11	R 8.25	7.85	N.O.
12	1.50	7.50	.5
13	1.25	2.00	N.O.
14	R 9.50	2.35	N.O.
15	R 6.30	7.85	3.1
16	2.50	....	1.2
18	2.00	....	.6
P			
1	R 4.50	.25	1.7
1x	Conv. 8.60	1.05	4.2
	O-D. 10.85	1.90	4.6
2	Conv. 2.10	.80	N.O.
	O-D. 2.50	1.65	N.O.
3	Conv. 10.60	S.L.	N.O.
	O-D. 12.85	S.L.	N.O.
4	3.75	S.L.	2.1
5	Conv. 8.60	8.55	N.O.
	O-D. 10.85	14.15	N.O.
6	R 6.10	S.L.	N.O.
7	2.70	....	N.O.
11	4.25	1.65	1.3
12	7.20	S.L.	N.O.
Q			
1	1.50	S.L.	N.O.
2	1.50	S.L.	N.O.
3	4.25	....	N.O.
4	4.25	....	N.O.
5	.75	N.C.	N.O.
6	1.75	6.10	.8
7	2.00	S.L.	.8
R			
1	6.00	1.35	2.2
2	19.00	25.40	4.3
3	5.00	.85	1.0
4	3.00	6.50	1.0
4b	8.25	7.80	N.O.
5	18.00	S.L.	N.O.
6a	8.00	5.00	N.O.
6x	R 11.50	3.30	N.O.
9	17.00	19.25	4.8
10	2.00	.55	.5
11	1.75	1.10	.8
12	3.75	2.40	1.1
S			
1-5A	1.00	N.C.	.4
6A	.50	N.C.	.3
4-5A	8.00	S.L.	N.O.
6A	9.50	S.L.	N.O.
5-5A	3.20	.10	1.3
6	3.20	.10	1.4
7-5A	2.70	7.50	1.1
6A	5.00	S.L.	2.7
7x-5A	2.00	S.L.	N.O.
6A	2.70	S.L.	N.O.
8	2.70	10.20	1.3
8x	2.25	S.L.	N.O.
9	1.00	N.C.	.3
10	1.00	N.C.	.3
U			
1	$0.40	N.C.	N.O.
2	1.00	....	.4
3	1.25	N.C.	.5
3x	.60	N.C.	N.O.
4	.60	N.C.	N.O.
6	.30	N.C.	.2
6x	1.25	....	.4
7	1.65	....	.9
7a	1.75	....	.5
7x	.45	....	.2
9	1.65	....	.6
10	2.60	....	1.4
11	2.80	....	N.O.
12	.85	N.C.	.5
12a	3.00	....	N.O.
12b	1.25	....	N.O.
13	1.00	N.C.	.5
13a	3.20	....	1.8
13b	1.50	....	N.O.
14	3.00	....	1.6
15	.75	N.C.	N.O.
15x	2.00	....	N.O.
15y	2.00	....	N.O.
15z	1.85	....	.8
16	.60	....	.3
17	1.25	....	.6
17a	.60	.60	.2
17x	1.00	.75	.4
18	7.00	....	2.0
19	.75	N.C.	N.O.
20	.50	.50	R .8
21	.60	1.25	.2
22	.50	....	.3
22x	1.00	N.C.	.2
23	.80	N.C.	.4
24	.75	1.35	.4
25	1.00	N.C.	.4
V			
1	3.25	23.75	1.5
2	4.00	27.25	1.7
3	2.50	14.00	1.2
5	1.25	8.75	.4
8	2.00	1.30	1.0
W			
1	.45	N.C.	.4
2	.30	.15	.1
2x	.20	N.C.	.1
3-5A	.90	N.C.	.3
6A	1.25	N.C.	.3
4	1.80	5.70	.6
4x	3.00	....	1.0
5	1.00	.50	.4
6	.25	N.C.	.2
7	.50	8.95	.5
8	.65	7.60	.4
X			
1	1.25	N.C.	.5
2	18.00	....	5.9
4	1.75	....	.8
5	3.25	....	1.6
6x	.75	....	.3
9	2.00	....	N.O.
10	52.00	56.00	27.1

N.C. = No Charge. N.O. = No Factory Operation. O.D. = Over Drive. S.L. = See Parts List.

Factory Hours from "Studebaker Service System," January 1, 1937

R IMPORTANT—Read below before quoting prices

R A7, 9—Material prices on 6A models include tie rod end assemblies.

R A23—Applies to front spring control link bushings (inner and outer).

R C2—On 5A models raise car at front end and remove core through bottom of shell.

On 6A models remove bracket support and remove core through top of shell.

R K9, 10—Done by renewing No. 1 main bearing.

R K11—See Note C 2.

R L1, 1a, 2—Includes removing manifold assembly.

R L6—Includes R. & R. of front fender clearance cover.

R M1, 3, 4—Includes removal of core and grille.

R O3, 4, 5, 8, 9, 11, 14, 15 Models with overdrive add $1.50 labor.

R P1, 6—See note 03.

R R6x—Carrier not removed.

MANUFACTURER HOURS

R E5—Rod adjustment not included.

R F3—Includes rebuilding engine.

R FH5, 5—Includes aligning rod or rods and disassembly of piston or pistons.

R G13—See E5.

R H1, 1x, 1a, 1b—See FH5.

R U20—Includes bleeding brakes.

TUNE-UP AND REPAIR DATA

Main Bearings: Steel backed, babbitt lined. Renewable from below.

Rod Bearings: Spun in babbitt. Rod and piston assemblies are removed from above.

Tappet Clearance: .016 in. cold.

Valve Timing: With inlet tappet set to .020 in. valve opens 15 deg. or 5½ flywheel teeth before T.C. With exhaust tappet set to .020 in. Exh. closes 10 deg., or 3½ flywheel teeth after T.C. Marks on cam and crankshaft gears should be nearest each other and on line between shaft centers.

Ignition Timing: Full automatic advance. Spark occurs 2 deg. before T.C., or when the mark IGN on vibration damper lines up with pointer.

Seat Angle of Valves: 45 degrees.

Car Serial Number Located: Plate on frame, under left front fender.

Engine Number Located: Left center of cylinder block, above distributor.

Interrupter Point Gap: .020 in.

Spark Plugs: Std. Champion 8-A. Set to .025 in.

Firing Order: 1, 5, 3, 6, 2, 4.

Brake Make, and Drum Diam.: Lockheed hydraulic, 11 in.

Brake Lining Total Length: Front: 3 ft. 3⅜ in. x 1¾ in. x 3/16 in. **Rear:** same. **Hand:** uses rear service shoes.

Oil Capacity Crankcase in Qts.: 5½.

Transmission Oil, Lbs. or Pts.: 2½.

Differential Oil, Lbs. or Pts.: 3.

Over-Drive & Transmission Oil, Lbs. or Pts.: 6.

Cooling System Capacity: 13 qts.

Oil Pressure: 40 lbs. at 25-30 m.p.h.

Compression Gage Pressure: 105 lbs. at cranking speed. Ratio 6.0 to 1.

Current Regulator: See page 85 in 11th Edition Flat Rate Manual for adjustment.

Steering Gear Adjustment: Ross cam and twin lever, see page 75 in 11th Edition Flat Rate Manual.

Carburetor Adjustment: Stromberg EX-23, see page 51 in 11th Edition Flat Rate Manual and Carter 371-S.

Rear Axle: Spicer, hypoid type.

Transmission: Warner gear.

Battery Terminal Grounded: Positive.

Shop Bookkeeping

(*Continued from page* 27)

are identical, that means the account is closed and you should draw a red line across the page, directly under the entry, indicating that the account is "balanced" and that the customer owes you nothing more. As the amounts are transferred from the Cash Book to the Accounts Receivable Ledger, put a small check mark by the figure you are transferring. This means the account has been posted and taken care of.

Before we leave the left side of the Cash Book, there is one more item not to be overlooked. That is, each time a deposit is made be sure and enter this amount on the check book stub in order to keep the bank balance in your check book up to date and you can, at any time, tell just how much money you have in the bank. Of course, as checks are drawn be sure and subtract them from the balance.

We will now explain the entries which are to be made on the right hand side of the Cash Book. All incoming invoices for merchandise which you purchased and charged will be recorded here. First enter the date, then the name of the person whose name appears on the invoice and the total amount. This amount goes into the second column headed Accounts Payable credit. The offsetting debit entry for this will be determined by referring to the Chart of Accounts. If the invoice is for anything purchased for resale like parts, tires, gas, oil, etc., it should be entered in the fourth column headed Expense debit and the number of that account noted in small figures to the left of the amount. For example, see sample entry made on first page. If the invoice is equipment purchased on time or on notes, the proper entry would be to write in the date and name and the amount in the Account Payable credit column. The offsetting debit entry goes into the General Ledger debit column. The reason for this being that the purchase was for equipment to be kept and not resold and must be added to your equipment account. So refer to the Chart and you will find the account number 402 is equipment. Insert this account number in small figures to the left of the amount in General Ledger debit column. The credit entry is put in the General Ledger column because it is not an account which has to be paid as other ordinary bills. This is considered Notes Payable, Equipment and has to be kept separate. Refer to the Chart again and you will find account number 601 is the number to insert to the left of the amount. See sample entry on first page.

If any money is borrowed from the bank or private party, it should be entered on this page. The proper entry would be to enter the date, name of the bank and the amount which was loaned to you (the full amount before deducting interest) is entered in the column headed General Ledger credit and the number of the account inserted, which in the case of money borrowed from the bank, is number 600. The offsetting debit entry is split into two entries. One for the actual cash you received which goes in the Cash debit column and the other for the amount of interest deducted by the bank. This interest item goes in the column headed Expense debit and the account number 34 inserted. At the same time, be sure and enter on the check stub the amount of money received and add to the balance in your check book.

Keeping an accurate account of the maintenance of service cars is just as important as entering invoices. You will recall that when the charge slips were made out mention was made of making similar slips for gas, oil, parts, etc. whenever the service car needed supplies. These slips you have been carefully saving for entry. In figuring the prices to put on these slips, the actual cost price should be listed as there is no profit on charging yourself more than what the actual cost was for anything that you are using for your benefit. Enter the date, and in the name space write either the name of the shop or the car, which ever you care to, and the amount goes into the Expense debit column with the account number 37 inserted. (Refer to the Chart in first article, Motor Age, May, 1937). The offsetting credit entry should go to the General Ledger credit column and insert the account number that appears under Sales on the Chart. This constitutes a sale of whatever you had

(*Continued on page* 72)

with More Power for Less Money

Here are the greatest sander values Van Dorn has ever offered.

NEW 7-INCH STANDARD SANDER (illustrated) built for continuous service—with ample power and ruggedness.....**$53.00.**

NEW 7-INCH JUNIOR SANDER—a powerful tool for intermittent service at the lowest price in Van Dorn history.....**$39.50.**

NEW 7-INCH HEAVY DUTY SANDER—built for high speed use on continuous production work.....**$75.00.**

NEW 9-INCH STANDARD SANDER—designed and built for more efficient work on larger areas.....**$78.00.**

One of the four new Van Dorn Sanders will exactly suit your requirements. Ask your Jobber for a demonstration, or write for catalog. The Van Dorn Electric Tool Co.; 727 Joppa Road, Towson, Md.

(Div. of The Black & Decker Mfg. Co.)

FOR POWER SPECIFY "Van Dorn" PORTABLE ELECTRIC TOOLS

AUTOMOTIVE EQUIPMENT TIME PAYMENT PLAN

Passenger Car Body Color List

Showing color code numbers with corresponding colors

AUBURN-CORD 1936

Color No. Location:

- Burnt Rust
- Cadet Gray
- Cigarette Cream
- Cool Orchard Green
- Deep Sea Green
- Ganges Green
- Harbor Mist Gray
- Midnight Blue
- Pouder Blue
- Redwood Beige
- Sun Tan
- Thrush Brown Light
- Twilight Mist

AUBURN-CORD 1937

Color No. Location:

- Cadet Gray
- Cigarette Cream
- Clay Rust
- Ganges Green
- Geneva Blue
- Ivory
- Palm Beach Tan
- Rich Maroon
- Thrush Brown Dark
- Thrush Brown Light

BUICK 1936 SERIES 40-60

Color No. Location: On Body No. Plate on Dash

423	Ballue Brown
427	Casino Beige
422	Chateau Green
424	Francis Cream
425	Moderne Gray Metallic
421	Musketeer Blue
430	Touraine Green
428	Trouville Blue

BUICK 1936 SERIES 80-90

Color No. Location: On Body No. Plate on Dash

373	Ballue Brown
377	Casino Beige
372	Chateau Green
374	Francis Cream
375	Moderne Gray Metallic
371	Musketeer Blue
380	Touraine Green
378	Trouville Blue

BUICK 1937

Color No. Location: On Body No. Plate on Dash

509	Bengal Brown
501	Chancellor Blue
502	Coronary Green
507	Ottawa Green
508	Samarra Beige
503	Sandringham Maroon
504	Sudan Blue
505	Wellington Grey
506	Windsor Grey
*	Sedge Grey
**	Marsh Brown

*—Instrument Panel
**—Steering Gear Column

CADILLAC 1936

Color No. Location:

	Arno Blue
4	Cannon Smoke
	Classic Blue
37	Clio Brown Dark
3	Dartmouth Green
36	Klamath Green
8	Pomerang Brown
2	Regent Maroon
6	Scarab Green
33	Thessalon Green

CADILLAC 1937

Color No. Location:

55	Andre Blue
51	Antionette Blue
60	Beauregard Beige
56	Bouquet Green
58	Cavalier Blue
53	Charlevoix Green
57	Frontenac Brown
54	La Mothe Grey
59	Menard Grey
52	Richelieu Maroon

CHEVROLET 1936

Color No. Location:

196	Black
197	Navy Blue
198	Regent Maroon
199	Willow Green
200	Kingswood Grey
201	Hollywood Tan
202	Taupe Metallic
203	Regatta Red
204	Cabana Cream
205	Black
206	Frosty Green

CHEVROLET 1937

Color No. Location:

210	Black
211	Regent Maroon
212	Regatta Red
213	Danube Dusk
214	Gunmetal Medium
215	Gazelle Brown
216	Beryl Green
217	Toronto Blue
218	Swan Grey
219	Brookhaven Blue

CHRYSLER 1936

Color No. Location: Plate on Dash Under Hood, except Airflow Model

Airflow Model: Plate Under Hood Right Side of Body over Wheel Housing

402	Delmonte Beige
508	Gunmetal Gray
311	Kiltie Green
224	Meadow Brook Blue
309	Polo Green
228	Skytint Blue
404	Stone Beige No. 2

CHRYSLER 1937

Color No. Location: Plate on Dash Under Hood, except Airflow Model

Airflow Model: Plate Under Hood Right Side of Body over Wheel Housing

304-305	Brewster Green
404	Delmonte Beige
503-504	Gunmetal Grey
224-227	Meadow Brook Blue
232	Parrot Blue No. 2
301-302	Polo Green
810	Santa Rosa Sand
229-230	Skytint

DE SOTO 1936

Color No. Location:

406	Autumn Gold
230-232	Blue Danube Blue
234	Capri Blue
315	Jade Green
408	Vogue Brown
813-814	Winchester Gunmetal

DE SOTO 1937

Color No. Location:

506	Chinchilla Gray
808	Chinese Gold
406	Desert Brown
311	Gem Green
244-245	Riviera Blue
408	Sable Brown
247	Skytint
806	Winchester Gunmetal

DODGE 1936

Color No. Location: Not Used

105-106	Black
302	Avon Green
209-210	Dodge Blue
501	Dolphine Gray
401	Golden Beige
803-804	Dodge Gunmetal
320	Hunter Green
805	Mercury Metallic
301	Palm Green
601-2-3	Regal Maroon
211	Stratosphere Blue
(Body)	*Nickel Gray No. 2
(Fender)	*Nickel Gray No. 3
(Body)	*Star Blue No. 1
(Fender)	*Star Blue No. 4
(Body)	*Blue Cloud No. 3
(Fender)	*Blue Cloud No. 4
	*Harvester Green

*Special Dodge Spring Colors—Not Used in Regular Production

DODGE 1937

Color No. Location: Not Used

309	Chillon Green
804	Gunmetal
234-5-6-7	Dodge Blue
307	Echelon Green
401-402	Golden Beige
241-242	Gyro Blue
801-802	Mercury Metallic
601-602	Regal Maroon
239	Stratosphere Blue
105-106	Black

FORD 1936

Color No. Location:

M-1748	Cordoba Tan
M-1746	Gray Vineyard Green
M-1745	Gunmetal Gray***
M-1747	Washington Blue***
M-1754	Armory Green
**	Bambolino Blue
M-1755	Desert Sand
M-1752	Light Fast Maroon

FORD 1937

Color No. Location:

M-1758	Bright Coach Maroon
M-1751	Bright Vineyard Green
M-1759	Autumn Brown
M-1760	Gull Grey***
M-1747	Washington Blue***
M-1761	Turquois Blue**
M-1762	Dalmation Green**
M-1764	Silver Wing Grey**
M-1769	Adobe Tan**

**Special Ford Color—Not Used in Regular Production
***Standard Models Only Furnished in these Colors

GRAHAM 1936

Color No. Location: On Plate on Right Body Sill, Back of Right Front Seat, Under Carpet

8-18-21	Aberdeen Gray
4-5	Berkshire Green
2-3-15-23	Fiatt Blue
9-20	Harlequin Tan
12	Manila Beige
11	Rialto Cream
13-19	Rustic Green
10	Wildermere Green
6-7-16-24	Hamlin Maroon
26	Freedom Blue
27	Calvert Red

GRAHAM 1937

Color No. Location: On Plate on Right Body Sill, Back of Right Front Seat, Under Carpet

12	Aberdeen Gray Light
9	Autumn Gold
2-3	Fiatt Blue
13	Freedom Blue
6-7	Hamlin Maroon
11	Mist Green
10	Mushroom Tan
4-5	Tropic Green
8	Vogue Brown

HUDSON-TERRAPLANE 1936

Color No. Location: Not Used

- Glacier Blue
- Hudson Blue
- Montana Green
- Neptune Gray
- Pepper Tan
- Sage Green
- Tuscan Tan
- Vineyard Green
- Lake Maroon
- Antique Ivory
- Black
- Green Gold

HUDSON-TERRAPLANE 1937

Color No. Location: Not Used

- Midnight Blue
- Gunmetal Gray
- Royal Maroon
- Opalescent Green
- Mandalay Ivory
- Peacock Green
- Twilight Gray
- Harvest Tan
- Desert Tan
- Ocean Blue
- Spruce Green
- Acorn Tan
- Black

LA SALLE 1936

Color No. Location:

93	Carlisle Beige Light
95	Colonial Cream
88	Corinthian Maroon
94	Dusty Gray
91	Nakhoda Blue
90	Phantom Metallic
92	Rain Green
89	Ridge Green

LA SALLE 1937

Color No. Location:

21	Admiral Blue
25	Briarcliff Blue
23	Douglas Green
27	Golden Beige
24	Peruvian Grey
22	Ricardo Maroon
28	Rockledge Grey
29	San Taupe
26	Springsdale Green

LINCOLN-ZEPHYR 1936

Color No. Location:

M-791	Benton Gray
M-796	Cardiff Green
M-787	Cordoba Gray
M-792	Gunmetal
M-4063	Meadowgrass Green
M-750	Royal Blue Dark
M-793	Stonington Gray
M-799	Zephyr Blue

LINCOLN-Zephyr 1937

Color No. Location:

M-4067F	Dawn Gray
M-4070F	Evergreen
M-4076F	Mercury
M-4066F	Ocean Beach Sand
M-798F	Royal Maroon
M-799F	Zephyr Blue
M-975	Black
M-4073F	Zephyr Garnet

LINCOLN 1936-1937

Color No. Location:

M-723	Black
M-750-A	Royal Blue
M-756-A	Old Chester Gray
M-758-A	Tunis Gray
M-760	Slate Green
M-762	Brewster Green Deep
M-777-A	Thorne Brown
M-778	Haverhill Brown
M-786	Shore Beige
M-787-A	Cordoba Gray
M-798-A	Royal Maroon

NASH-LAFAYETTE 1936

Color No. Location: Not Used

36	Chicola Green
8	Clipper Blue
51	Golden Beige
49	Grenada Gray
9	Gunmetal
25	Kiltie Green
43	Matelot Blue
48	Regent Maroon
50	Seaman Blue
7	Black

NASH-LAFAYETTE 1937

Color No. Location: Not Used

15	Admiral Blue
16	Cascade Blue
12	Dartmouth Green
10	Gunmetal
11	Trianon Green
14	Tropic Tan
13	Wenonah Maroon
7	Black

OLDSMOBILE 1936

Color No. Location: On Plate on Le Side of Cowl

104	Buckingham Gray Light
108	Bundy Brown
105	Gallant Blue
107	Glyndon Green
102	Mansion Maroon
106	Olympic Blue
103	Tuscany Brown
109	Dawn Gray

OLDSMOBILE 1937

Color No. Location: On Plate on Left Side of Cowl

130	Agate Red
126	Bruce Blue
124	Delmar Gray
122	Mansion Maroon
125	Ormond Tan
123	Runnymede Green
131	Santone Cream
128	Steel Blue
127	Tulipwood Brown

PACKARD 1936 SERIES 14

Color No. Location: Not Used

M	Columbian Beige
Z	Tuscan Red
F	Geneva Blue
A	Gunmetal Light
B	Packard Blue
K	Roanoke Gray Light
C	Roosevelt Maroon
D	Shirvan Green
E	Swiss Green

PACKARD 1936 SERIES 120

Color No. Location: Not Used

J	Almond Green
Y	Dustproof Gray Medium
P	Golden Tan
A	Gunmetal Light
G	Mayan Maroon
L	Orleans Blue
B	Packard Blue No. 3
T	Packard Cream
H	Thistle Green Dark

Passenger Car Body Color List—*continued*

Showing color code numbers with corresponding colors

PACKARD 1937 ALL MODELS
Color No. Location: Not Used

Color No.	Color
J	Almond Green Metallic
Y	Buckingham Gray
L	Centennial Blue
T	Packard Cream
A	Gunmetal Light Metallic
H	Hickory Leaf Green
B	Packard Blue
G	Packard Maroon
P	Rich Loam Metallic
Z	Black

1937 Special Introductory Shades

E	Coachman Green
K	Dawn Gray
S	Iridium Gray Metallic
F	Regatta Blue Metallic
Z	Indian Maroon

PIERCE-ARROW 1936-1937
Color No. Location:

128	Clayrust No. 3
129	Doetan
125	Dovetone Light
123	Greentone
130	Hals Maroon
126	Liqueur Yellow
121	Lombardo Blue
122	Parrot Blue
120	P. A. Blue Deep
124	P. A. Green Dark
127	Oystershell No. 3
131	Plaid Green No. 1
132	Sconebeige No. 3
133	Baker Blue No. 2

PLYMOUTH 1936
Color No. Location:

212-213-214	Aquamarine Blue
806-807-808	Plymouth Gunmetal
218-219-220	Middy Blue
502-503-504	Palm Beach Gray No. 2
414	Plymouth Beige
201-202-203	Plymouth Blue
604-605-606	Plymouth Maroon

PLYMOUTH 1937
Color No. Location:

209-210-211	Aquamarine Blue
812-813-814	Plymouth Gunmetal
217-218-219	Middy Blue
410-411	Plymouth Beige
201-202-203	Plymouth Blue
313	Garfield Green

PLYMOUTH 1937 (West Coast Only)*
Color No. Location:

XLE-283	Aquamarine Blue (Opalescent)
XLE-282	Plymouth Beige (Opalescent)
XLE-286	Plymouth Gunmetal (Opalescent)

*These Three Opalescent Colors are used in West Coast Production only.

PONTIAC 1936
Color No. Location: On Body No. Plate Attached to the Left Side of Dash, Under the Hood.

2125D	Denmark Blue Metallic
2124D	Dusty Gray
2120D	Harbor Mist Gray
2119D	Maple Leaf Green
2121D	Martini Brown
2117D	Pontiac Blue
2122D	Sand Dune Cream
2118D	Wenonah Maroon
2130D	Arno Blue
2126D	Silver Streak Gray
2128D	Carribean Blue
2129D	Santa Fe Beige
2127D	Neptune Green

PONTIAC 1937
Color No. Location: On Body No. Plate Attached to the Left Side of Dash, under the Hood

2205D	Dolphin Gray
2206D	Golden Brown
2207D	Lindon Cream
2201	Starlight Blue
2201D	Starlight Blue
2202	Wenonah Maroon
2202D	Wenonah Maroon
2204D	Glyndon Green

STUDEBAKER 1936
Color No. Location: At Body Side of Dash

6960-HOE	Amber Tan-Dark
6956-HOC	Amber Tan-Light
6874-HMY	Beverly Blue
6953-HOL	Everglades Green-Dark
6949-HOI	Everglades Green-Light
6963-HOR	Grapetone Maroon
6975-HNK	Silver Gray-Dark
6968-HOG	Silver Gray-Light
6777-HLC	Willow Leaf Gray

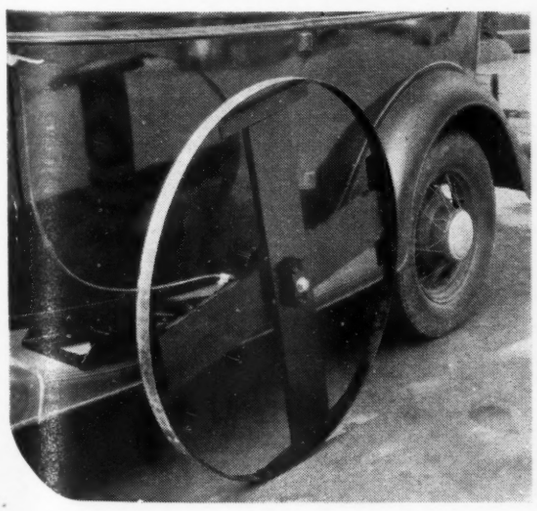
STUDEBAKER 1937
Color No. Location: At Body Side of Dash

7059-HRJ	Bermuda Blue
6874-HMY	Beverly Blue
7071-HRS	Colorado Brown
7063-HRM	Glacier Park Gray
6963-HOR	Grapetone Maroon
7121-HSV	Hollywood Beige
7116-HSS	Miami Green
7096-HSH	Niagara Mist

WILLYS 1937
Color No. Location: Not Used

34	Gunmetal Gray
32	Pueblo Brown
30	Pyrol Green
33	Rust "C"
31	Squadron Blue
35	Lime Light Blue
36	Rust "E"
29	Black
38	Maroon
37	Yellow
28	Prime

STOCK feed grinding mill and molasses impregnator mounted on a Diamond T truck serving the farming area near Lapeer, Mich., twice monthly



THIS wheel (lower left) is used for making rapid surveys of cracks in concrete pavements. Attached to the running board of a car, the wheel has a revolution counter affixed so that the surveyor may chart the broken concrete quickly. (Lower right) Lincoln-Zephyr cars are given a man-made "cloudburst" on the final "clean up" line at the Detroit Lincoln factory

Olds Transmission

(Continued from page 21)

at speeds above 22 m.p.h., the transmission will operate in direct drive unless the accelerator is depressed to the wide open position. In such case the transmission will automatically shift down to third gear and remain there until 65 m.p.h. is exceeded when the transmission will shift to direct.

However, it is also possible to start the car with the shift lever in the high forward position. The procedure is to disengage the clutch and start the engine. Then, with the clutch disengaged, place the shift lever in the high forward position. Release the clutch pedal in the normal manner and the car will move forward in first gear and shift automatically into third gear at approximately 8 m.p.h. and then into fourth gear at 22 m.p.h., if the throttle is only partly open, or at 65 m.p.h., if the throttle is wide open.

If when driving in high it is desired to shift to low, all that is necessary is to move the shift lever to the desired position. While this shift can be made at any throttle position, a more pleasing shift is obtained if the acelerator pedal is momentarily released. This procedure prevents excessive slipping of disk clutches within the transmission.

To reverse the direction of the car, the same procedure is followed except that the shift lever is placed in the reverse position. Before the lever can be moved to that position, it is necessary to depress a button at the outer end of the shift lever.

Incidentally, when starting a stalled car by towing, the clutch is disengaged and the shift lever is moved to the high range position. Tow the car and when a speed of 10 m.p.h. is reached, turn on the ignition and engage the clutch.

Taking up the operation of this unit we find that the Olds automatic transmission consists essentially of the head gear set; the front planetary unit; the rear planetary unit; the oil control unit; the oil valve, the oil pump and the governor. The details of these points are brought out in the ilustrations and the automatic shifting is secured by means of oil pressure which is directed by means of a flyball type governor and the necessary control valves.

The oil pump which provides the oil pressure is a double geared type having two drive gears of unequal size and two driven gears of unequal size. The larger drive gear operates from the counter shaft and supplies the lubricant, which is an engine oil, to the various points within the transmission. The smaller drive and driven gears operate off a worm gear on the main shaft and consequently operate only when the rear wheels are turning.

The front planetary unit consists of a planetary drive gear, a carrier with three small planet gears, a center gear and planetary drum. When the brake band is applied to the drum, the power is transmitted from the drive gear through the planet gears to the planet carrier while the center gear and drum remain stationary. That is, the engine will make 1.42 revolutions to one complete turn of the main shaft.

When the brake band is not applied the planetary unit is not operating as a reducing unit but furnishes a direct coupling through an oil pressure controlled multiple disk clutch to the rear planetary unit.

Under all conditions at the same instant, when oil pressure starts to engage the disk clutch, it disengages the brake bands. The reverse is also true when the brake bands are engaged, the clutch is disengaged. This condition is obtained since both the disk clutch and the brake band are supplied oil pressure through the same oil line.

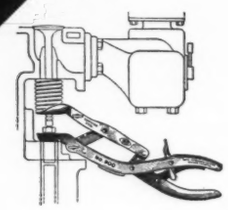
The brake bands are operated by means of the servo unit. Heavy springs tighten the band while oil pressure releases the band.

The rear planetary and servo units are similar to the front unit except that there are two sets of planetary gears, the disk clutch is of greater capacity and the reduction ratio is greater.

Taking up the sequence of operation, assume that the gear shifter has been placed in "low" forward position. This engages the sliding gear and clutch gear. As the car is not moving, the oil pump driven from the transmission main shaft is not operating. Consequently, there is no oil pressure to engage either of the disk clutches on the planetary units and both brake bands on the two planetary units are tight. In other words, maximum reduction is ob-

A New K-D LIFTER for the New Motors

No. 900 in position on a Plymouth 1936 Motor. Note generous working space and clear view of valve.



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The new K-D No. 900 Lifter is the fastest Valve Lifter to satisfactorily service the new 1935, 1936, and 1937 Plymouth, Dodge, Dodge Truck, De Soto, Chrysler Airstream and Airflow. Also Hudson, Oldsmobile, Pontiac, Studebaker, Terraplane, etc.

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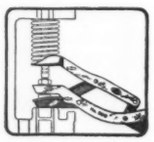

Auxiliary jaws swing into position for motors with unusual clearance between tappet housing and valve spring washer.

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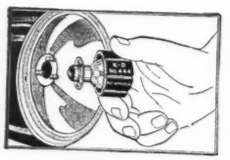

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tained as both planetary units are operating. As the engine clutch is engaged the car will move forward in low gear.

As soon as the car moves, the oil pump will develop pressure and when a speed of 10 m.p.h. is reached, the oil pressure is directed by means of the governor and the oil control unit so as to overcome the pressure of the spring in the front servo, releasing the front planetary brake band and at the same time engaging the disk clutch at the forward end of the planetary assembly. The clutch on the rear planetary unit, however, is not engaged but the brake is applied. The transmission has then automatically shifted to second speed; only the rear planetary unit is operating as a reduction unit while engagement of the disk clutch on the front servo provides a direct coupling from the clutch gear to the rear planetary unit.

If the shifter lever below the steering wheel is now shifted to the high forward position, the oil in the transmission will be directed through the governor and oil control unit so that the disk clutches on each planetary unit will be engaged and the brakes on the two units are free. In other words, the car is now driving in direct gear. Provided, of course, that the car is moving in excess of 22 m.p.h. and that the throttle is not wide open.

If the throttle is wide open and the car speed less than 65 m.p.h., the transmission will operate in third gear, with the front planetary unit operating as a reduction unit and the rear unit in direct drive with the disk clutch engaged and the planetary brake band free.

A more detailed description of the oil distributing system is of interest. The pump discharge flows to the pressure regulator valve where it is distributed to the oil control unit and the lubricating system. As oil pressure increases, the oil regulator valve is lifted from its seat to its pressure regulating position which is 85 lb. pressure, excess oil being by-passed to the oil pan. There is also a by-pass on the external cover of the oil pump which regulates the pressure to the lubricating system.

If the shift lever is in the high position and the car speed drops so that there is only 45 lb. pressure from the pump, the pressure regulator valve drops back to its seat and the transmission shifts to low gear.

Distribution of the oil pressure to different points to meet the changing driving conditions is controlled by three oil valves incorporated in a single unit. One valve, which is manually controlled by the hand shift lever is known as the rear unit and effects the operation of the rear planetary unit only.

Another valve which is controlled by the governor effects the operation of the front unit only. A third valve, known as the throttle control valve, effects the operation of both planetary units and its operation is controlled by the foot accelerator only. This valve does not cause any actual shifting. Its purpose is to bring about smooth shifts at various throttle positions by correctly proportioning the transmission clutch capacity to the load the clutches must carry.

The governor, the remaining unit of the automatic shifting mechanism, effects the operation of the front planetary system only and is driven by the same gear on the counter shaft which drives the large section of the oil pump. While it effects the front planetary unit only, it is in operation when shifting from first to second, second to first, third to fourth and fourth to third.

Gasket Cement Listed

According to information received from the P.O.B. Mfg. Co., Cincinnati, Ohio, manufacturers of Perfect Seal gasket cement, the following companies list Perfect Seal in their official parts books as follows: Chevrolet part No. 985145; Oldsmobile Part No. 985145; Auburn Part No. 29230; Cadillac Part No. 1096831; Chrysler Corp. 656073; Evinrude Motors Part No. 171110; General Motors Parts Corp. Part No. 985145; General Motors of Canada Part No. 27282-R; Graham Part No. 26686; Hudson Part No. 47568; Nash Part No. 48859; Packard Part No. 98666; Studebaker Part No. S-266.

In addition Continental Motors uses Perfect Seal on all head gaskets, Hercules uses it on all Diesel engines, Winton and Massey-Harris use it on all tractor engines and Lycoming uses it on all engine production.

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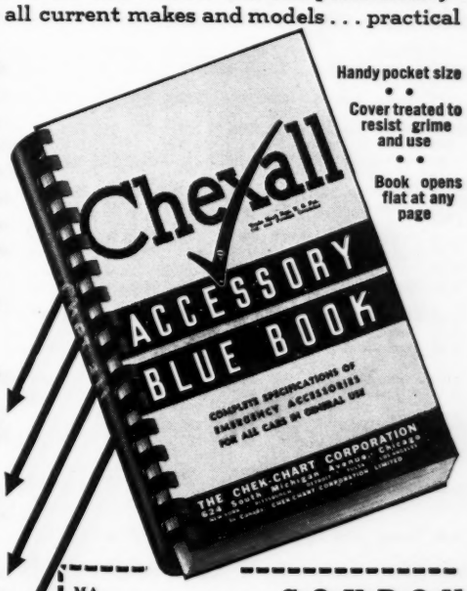

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Line Number	MAKE AND MODEL	Lowest Priced 4-d. Sed. (Dlvd.)	Wheelbase (Ins.)	Tire Size (Ins.)	ENGINE															CHASSIS						
					No. of Cylinders, Bore and Stroke	Taxable HP.	Piston Displacement (Cu. Ins.)	Maximum Brake HP. at Specified R.P.M.	Compression Ratio (to—1.)	Displacement Factor §	Cylinder Head Material	Camshaft Drive Make	Piston Material	Oil Cleaner Make	Air Cleaner Make	Carburetor Make	Muffler Make	Electrical System Make	Battery Make	Clutch Type and Make	Gearset Make	Universals Type and Make	Rear Axle Type and Make	Rear Axle Ratio	Front Spring Suspension
1	Buick....37-40	950	122	6.50/16	8-3 3/8x4 1/8	30.6	248.0	100-3200	5.70	39.2	CI	LB	Ala	No	AC	SM	Wal	D	Del	P.Own	Own	m-Spi	½ Own	4.40	IC
2	Buick....37-60	1162	126	7.00/15	8-3 1/8x4 1/8	37.8	320.2	130-3400	5.90	42.7	CI	LB	Ala	No	AC	SM	Wal	D	Del	P.Own	Own	m-Spi	½ Own	3.90	IC
3	Buick....37-80	1418	131	7.00/16	8-3 1/8x4 1/8	37.8	320.2	130-3400	5.90	39.4	CI	LB	Ala	No	AC	SM	Wal	D	Del	P.Own	Own	m-Spi	½ Own	4.22	IC
4	Buick....37-90	1966	138	7.50/16	8-3 1/8x4 1/8	37.8	320.2	130-3400	5.90	40.2	CI	LB	Ala	No	AC	SM	Wal	D	Del	P.Own	Own	m-Spi	½ Own	4.62	IC
5	Cadillac..V8-60 & 65	(f)	124-131	(t)	8-3 1/2x4 1/2	39.2	346.0	135-3400	6.25	40.9	CI	Mor	Ala	Han	AC	Str	Old	D	Del	P.Long	Own	Nb-Mec	½ Own	(u)	IC
6	Cadillac..V8-70 & 75	(h)	131-38	7.50/16	8-3 1/2x4 1/2	39.2	346.0	135-3400	6.25	41.4	CI	Mor	Ala	Han	AC	Str	Old	D	Del	P.Long	Own	Nb-Mec	½ Own	(v)	IC
7	Cadillac.....V12-85	3535	138	7.50/16	12-3 1/8x4	46.9	368.0	150-3600	6.00	40.8	CI	Mor	Ala	Han	AC	DL	Own	D	Del	P.Long	Own	Nb-Mec	½ Own	4.60	IC
8	Cadillac.....V16-90	7545	154	7.50/17	16-3x4	57.6	452.0	185-3800	6.00	40.5	CI	Mor	Ala	Han	AC	DL	Own	D	D	dp.Own	Own	Nb-Mec	¾ Own	4.64	IC
9	Chevrolet....Master	667	112¼	6.00/16	6-3 1/2x3 3/4	29.4	216.5	85-3200	6.25	35.4	CI	Own	CI	No	AC	Car	Own	D	D	P.Own	Own	m-Own	½ Own	3.73	C
10	Chevrolet..Mas.DeL.	739	112¼	6.00/16	6-3 1/2x3 3/4	29.4	216.5	85-3200	6.25	39.0	CI	Own	CI	No	AC	Car	Own	D	D	P.Own	Own	m-Own	½ Own	4.22	IC
11	Chrysler...Roy. C-16	910	116	6.25/16	6-3 3/8x4 1/4	27.3	228.1	93-3600	6.50	38.8	CI°	Mor	Ala	Pur	Bur	Car	NS	A	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	IC
12	Chrysler...Imp. C-14	1100	121	6.50/16	8-3 1/4x4 1/8	33.8	273.8	110-3600	6.70	41.7	Al	Mor	Ala	Pur	AC	Str	NS	A	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	IC
13	Chrysler.Cus.Im.C-15	2060	140	7.50/16	8-3 1/4x4 7/8	33.8	323.5	130-3400	6.50	....	Al	Mor	Ala	Pur	AC	Str	NS	A	Wil	P.B&B	WG	Nb-UP	½ Own	4.55	IC
14	Chrysler.Airflow C-17	1610	128	7.50/16	8-3 1/4x4 7/8	33.8	323.5	130-3400	6.50	40.3	Al	Mor	Ala	Pur	AC	Str	Bur	A	Wil	P.B&B	WG	Nb-UP	½ Own	4.30	C
15	Cord.....812	(i)	125-132	6.50/16	8-3 1/2x3 3/4	39.2	288.6	115-3600	6.32	40.3	Al	Whit	Al	No	AC	Str	NS	A	USL	P.Long	Own	Ben	Tu Own	4.70	IT
16	Cord.....S.C. 812	(j)	125-132	6.50/16	8-3 1/2x3 1/4	39.2	288.6	175-4200	6.32	40.3	Al	Whit	Als	No	AC	Str	Pratt	A	USL	P.Long	Own	Ben	Tu Own	4.70	IT
17	De Soto.....S-3	870	116	6.00/16	6-3 3/8x4 1/4	27.3	228.1	93-3600	6.50	39.0	CI°	Mor	Ala	Pur	Bur	Car	NS	A	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	IC
18	Dodge.....Six	820	115	6.00/16	6-3 1/4x4 3/8	25.3	217.8	87-3600	6.50	38.7	CI	Mor	Als	Pur	AC	Str	NS	A	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	C
19	Duesenberg.....J	.....	142-153½	7.00/19°	8-3 3/4x4 3/4	45.0	419.7	320-4200	5.20	....	CI	LB	Al	Pur	Yes	Str	.....	D	Exi	dpLong	Own	m-Spi	½ Own	....	C
20	Ford.....V8-60	604‡	112	5.50/16	8-2.6x3.2	21.6	136.0	60-4200	6.6	30.4	Al	Gear	CS	No	Yes	Str	Own	O	Own	P	Own	m-Spi	¾ Own	4.44	Tr
21	Ford.....V8-85	645‡	112	6.00/16	8-3 1/16x3 3/4	30.0	221.0	85-3800	6.12	37.9	Al	Gear	CS	No	Yes	Str	Own	O	Own	P.Os	Own	m-Spi	¾ Own	3.78	Tr
22	Graham.....85	770	111	(s)	6-3x4	21.6	169.6	70-3500	6.80	35.7	Al	LB	Als	No	Bur	Mar	Old	D	Wil	P.III	WG	Nb-UP	½ Spi	4.55	C
23	Graham.....95	905	116	6.00/16	6-3 1/4x4	25.3	199.1	85-3800	6.70	37.9	Al	LB	Als	No	Bur	Mar	Old	D	Wil	P.Long	WG	Nb-UP	½ Spi	4.45	C
24	Graham.....S.C. 116	1050	116	6.25/16	6-3 1/4x4	25.3	199.1	106-4000	6.70	....	Al	LB	Als	Fram	Bur	Mar	Old	D	Wil	P.Long	WG	Nb-UP	½ Spi	4.27	C
25	Graham.....S.C. 120	1160	116-120	6.50/16	6-3 1/4x4 3/8	25.3	217.8	116-4000	6.70	....	Al	LB	Als	Fram	Bur	Mar	Old	D	Wil	P.Long	WG	Nb-UP	½ Spi	4.27	C
26	Hudson.....6-73	945	122	6.00/16	6-3x5	21.6	212.0	101-4000	6.25	36.8	CI°	Ge°	Al	No	AC	Car	Old	A	Nat	P.Own†	Own	Nb-Spi	½ Own	4.11	C
27	Hudson..8, 74-5-6-7	1010	122, 129	6.25/16	8-3x4 1/2	28.8	254.0	122-4200	6.25	41.2	CI°	Ge°	Al	No	AC	Car	Old	A	Nat	P.Own†	Own	Nb-Spi	½ Own	4.11	C
28	La Salle...V8, 37-50	1260	124	7.00/16	8-3 3/8x4 1/2	36.4	322.0	125-3400	6.25	41.0	CI	Mor	Ala	Han	AC	SC	Old	D	Del	P.Long	Own	Nb-Mec	½ Own	3.92	IC
29	Lincoln.....V12	4450‡	136-145	7.50/17	12-3 1/16x4 1/2	46.8	414.0	150-3400	6.38	38.9	Al	Ch	Ala	Pur	Yes	Str	Own	A	Exi	P.Long	Own	m-Spi	FF Tim	4.58	C
30	Lincoln-Zephyr.....	1265‡	122	7.00/16	12-2 3/4x3 3/4	36.3	267.3	110-3900	6.7	42.6	Al	Gear	CS	No	Yes	Str	Own	O	Own	P.Os	Own	m-Own	¾ Own	4.44	Tr
31	Nash...Amb. 6, 3720	960	121	6.25/16	6-3 3/8x4 3/8	27.3	234.8	93-3400	5.67	36.2	CI	Whit	Als	BS	AC	Str	Wal	A	USL	P.B&B	Ot	Nb-Mec	½ Own	4.11	C
32	Nash...Amb. 8, 3780	1080	125	7.00/16	8-3 1/8x4 1/4	31.2	260.8	105-3400	5.64	35.5	CI	Dia	Als	BS	Bur	Str	Wal	A	USL	P.B&B	Ot	Nb-Mec	½ Own	4.10	C
33	Nash Lafay 400-3710	810	117	6.00/16	6-3 3/8x4 3/8	27.3	234.8	90-3400	5.61	37.4	CI	Whit	Als	.....	Bur	Str	Wal	A	USL	P.B&B	Ot	Nb-Mec	½ Own	4.11	C
34	Oldsmobile.....F37	875	117	6.50/16	6-3 7/16x4 1/8	28.4	229.7	95-3400	6.10	38.1	CI	Whit	Ala	No	AC	Car	Var	D	D	P.B&B	Own	Nb-Mec	½ Own	4.37	IC
35	Oldsmobile.....L37	990	124	7.00/16	8-3 1/4x3 7/8	33.8	257.1	110-3600	6.20	39.1	CI	LB	Ala	No	AC	Car	Var	D	D	P.B&B	Own	Nb-Mec	½ Own	4.37	IC
36	Packard.....115C	995	115	6.50/16	6-3 7/16x4 1/4	28.3	237.0	100-3600	6.30	39.7	CI	Mor	Als	No	AC	CG	Old	D	Wil	P	Own	Nb-Mec	½ Own	4.36	IC
37	Packard.....120C	1170	120	7.00/16	8-3 1/4x4 1/4	33.8	282.0	120-3800	6.50	40.7	Al	Mor	Als	No	AC	SC	Old	A	PD	P	Own	Nb-Mec	½ Own	4.09	IC
38	Packard...1500, 1, 2	2480	127-34-39	7.50/16	8-3 7/16x5	32.5	320.0	130-3200	6.50	41.0	Al	Mor	Als	Pur	AC	Str	Old	DA	PD	P	Own	Nb-UP	½ Own	4.69	IC
39	Packard...1506, 7, 8	3670	132-39-44	8.25/16	12-3 7/16x4 1/4	56.7	473.0	175-3200	6.40	46.8	Al	Mor	Als	Pur	AC	Str	Old	DA	PD	P	Own	Nb-Spi	½ Own	4.41	IC
40	Pierce-Arrow...1701	3375	138-144	7.00/17	8-3 1/2x5	39.2	385.0	150-3400	6.40	37.6	Al	Whit	Als	Pur	AC	Str	Buf	D‡	Wil	P.Long	WG	Nb-UP	½ Own	4.58	C
41	Pierce-Arrow...1702	3895	138-144	7.50/17	12-3 1/2x4	58.8	462.0	185-3400	6.40	42.0	Al	Whit	Als	Pur	AC	Str	Buf	D‡	Wil	P.Long	WG	Nb-UP	½ Own	4.58	C
42	Pierce-Arrow...1703	5015	147	7.50/17	12-3 1/2x4	58.8	462.0	185-3400	6.40	40.7	Al	Wh t	Als	Pur	AC	Str	Buf	D‡	Wil	P.Long	WG	Nb-UP	½ Own	4.58	C
43	Plymouth.....P3	665	112	5.50/16	6-3 1/8x4 3/8	23.4	201.3	82-3600	6.70	36.7	CI	Mor	Ala	No	BA	Car	NS	A	Wil	P.B&B	Own	Nb-UP	½ Own	3.90	C
44	Plymouth.....P4	745	112	6.00/16	6-3 1/8x4 3/8	23.4	201.3	82-3600	6.70	36.5	CI	Mor	Ala	Pur	BA	Car	NS	A	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	C
45	PontiacDeL.6,37-26CA	736	117	6.00/16	6-3 7/16x4	28.3	222.7	85-3600	6.20	38.5	CI	Mor	CHI	No	AC	Car	BO	D	Del	P.Own	Own	Nb-Mec	½ Own	4.37	IC
46	Pontiac DeL.8,37-28A	894	122	6.50/16	8-3 1/4x3 3/4	33.8	248.9	99-3800	6.20	40.5	CI	Mor	CHI	No	AC	Car	BO	D	Del	P.Own	Own	Nb-Mec	½ Own	4.37	IC
47	Studebaker...Dict. 6	880	116	6.00/16	6-3 1/4x4 3/8	25.4	217.8	90-3400	6.00	40.2	CI	Dia	Ly	Fram	AC	SC	Buf	A	Wil	P.B&B	WG	Ru-Th	½ Spi	4.55	C
48	Studebaker .Dict. Pl.	900	116	6.00/16	6-3 1/4x4 3/8	25.4	217.8	90-3400	6.00	40.2	CI	Dia	Ly	Fram	AC	SC	Buf	A	Wil	P.B&B	WG	Ru-Th	½ Spi	4.55	IT
49	Studebaker....Pres.	1165	125	6.50/16	8-3 1/16x4 1/4	30.0	250.4	115-3600	6.50	39.9	Al	Dia	Ly	Fram	Bur	Str	Bur	D	Wil	P.Long	WG	Nb-Spi	½ Spi	4.55	IT
50	Terrap ..DeL.&Sup.6	790	117	6.00/16	6-3x5	21.6	212.0	96-3900	6.25	38.3	CI°	Ge	Al	No	AC	Car	Old	A	Nat	P.Own†	Own	Nb-Spi	½ Own	4.11	C
51	Willys.....37	545	100	5.50/16	4-3 1/8x4 3/8	15.6	134.2	48-3200	5.70	32.2	CI	LB	CI	F-O	AC	Til	Buf	A	USL	P.B&B	WG	m-UP	½ Own	4.30	C

ABBREVIATIONS—General

°—Others also
*—Measured on rim of Flywheel
½—Semi-floating
¾—Three-quarter floating
†—Power Clutch
††—With clearance of .015 the valve is .004 off its seat.
‡—Does not include Federal Taxes
§—Computed on basis of displacement, gear ratio, effective tire diameter, and weight with normal load.

(a)—(−¼ to +½)
A—Above (rods removed from)
A—After top center
AA—Automatic adjuster
Ad—Advanced Al—Aluminum
Ala—Aluminum, Anode processed
Als—Aluminum with struts
Au—Automatic (b)—0 to −½
B—Below (rods removed from)
B—Before top center
Bm—Before marks on vibration damper
(c)—60, ¼−1; 65, −¼ to +¼
C—Conventional
C—Cold (Tappet clearance)
Ch—Chain
CHI—Chrome Nickel Iron
CI—Cast Iron CS—Cast Steel
(d)—60, ¼−1; 65, 0 to ½
dp—Double plate clutch
(e)—60, 4°51′; 65, 5°38′
(f)—60-1660, 65-2090
F—Floating (Piston Pin)
FF—Full floating
(g)—60, 155X; 65, 170X
(h)—70-2595, 75-2815
H—Hot (tappet clearance)
(i)—2445-2860 IC—Independent coil
IT—Independent Transverse
(j)—2960-3375
(k)—Intake, .0125—Exhaust, .0156
Ly—Lynite m—Metal
M—Mechanical N—Negative
(n)—Intake, .0124—Exhaust, .0156
Nb—Needle bearing
Ot—Overdrive transmission
P—Piston (Pin Locked in)
P—Single plate clutch
PH—Power operated, hydraulic brakes
R—Rod (Pin locked in)
(r)—Out only Ru—Rubber
(s)—2 door sedan 5.25/17. 4 door sedan 6.00/16
(t)—60, 7.00/16; 65, 7.50/16
TC—Top Center
Tr—Transverse Tu—Tubular
(u)—60, 3.69; 65, 4.30
(v)—70, 4.30; 75, 4.60
Var—Various
x—At 1000 R.P.M.
y—At 2800 R.P.M.
(z)—Or Champion

Tune-Up Specifications

Car Manufacturers and Supersede All Others Previously Published

Service Brake Make and Type	Steering Gear Make	Compression Pressure at Cranking Speed (Lbs.)	Spark Plug: Make and Type	Rings: No. and Width Comp.	Rings: No. and Width Oil	Piston Pin Diameter	Piston Pin Locked in	Valves: Head Diameter and Seat Angle: Inlet (Ins.)	Inlet Seat Angle (Degrees)	Exhaust (Ins.)	Exhaust Seat Angle (Degrees)	Valves: Stem Diameter (Ins.)	Valves: Operating Tappet Clearance: Inlet	Exhaust	Inlet Tappet Clearance for Valve Timing	Valves: Intake Valve Opens Before or After T.C.: No. of Degrees	No. of Flywheel Teeth	Ignition: Breaker Points Gap (Ins.)	Spark Plug Gap (Ins.)	Timing: Spark Occurs °TC	Timing: No. of Flyw. Teeth Spark Occurs TC	Breaker Housing	Rods Removed From	Crankpin Diameter (Ins.)	Crankpin Length (Ins.)	Capacity Crankcase (Qts.)	Capacity Cooling System (Qts.)	Front Axle: Caster (Degrees)	Front Axle: Camber (Degrees)	Front Axle: Toe-in (Inches)	Front Axle: King Pin Inclination (Degrees)	Line Number
OH	S...	106	AC-H9	2-3/32	2-3/16	13/16	R..	1 17/32	45	1 13/32	45	.372	.015H	.015H	††	13B...	5 1/4B	.015	.025	6B...	2 1/4B.	Au.	A.	2	1 7/32	6	13 1/4	1/4 ± 3/8	-1/4, +1	0-1/8	3 1/2-4 1/2	1
OH	S...	106	AC-H9	2-3/32	2-3/16	7/8	R..	1 25/32	45	1 7/16	45	.372	.015H	.015H	††	14B...	6B...	.015	.025	10B..	4 1/2B.	Au.	A.	2 1/4	1 1/8	8	17	1/4 ± 3/8	-1/4, +1	0-1/8	3 1/2-4 1/2	2
OH	S...	106	AC-H9	2-3/32	2-3/16	7/8	R..	1 25/32	45	1 7/16	45	.372	.015H	.015H	††	14B...	6B...	.015	.025	10B..	4 1/2B.	Au.	A.	2 1/4	1 1/8	8	17	0 ± 3/8	-1/4, +1	0-1/8	4 1/2-5 1/2	3
OH	S...	106	AC-H9	2-3/32	2-3/16	7/8	R..	1 25/32	45	1 7/16	45	.372	.015H	.015H	††	14B...	6B...	.015	.025	10B..	4 1/2B.	Au.	A.	2 1/4	1 1/8	8	17	0 ± 3/8	-1/4, +1	0-1/8	4-5	4
BH	S...	(g)	AC-K7	2-1/8	2-5/32	7/8	F..	1.87	45	1.62	45	.341	AA...	AA...	0	TC...	TC...	.015	.027	5B...	2 1/4B.	Ad.	A.	2.46	2 3/32	7	25	(c).....	(d) ...	1/32-3/32	(e)..	5
BH	S...	170x	AC-K7	2-1/8	2-5/32	7/8	F..	1.87	45	1.62	45	.341	AA...	AA...	0	TC...	TC...	.015	.027	5B...	2 1/4B.	Ad.	A.	2.46	2 3/32	7	25	0-±1/4	0-1/2	1/32-3/32	5°38′	6
BH	S...	145x	AC-G7	3-3/32	1-5/32	7/8	P..	1.51	45	1.39	45	.339	AA...	AA...	0	TC...	TC...	.021	.025	10B.	3B...	Ad.	B.	2 1/2	2 1/4	9	17	0-±1/4	0-1/2	1/32-3/32	5°38′	7
OP	S...	154x	AC-G6	3-3/32	1-5/32	7/8	P..	1.51	45	1.39	45	.339	AA...	AA...	0	TC...	TC...	.016	.025	4B...	1 1/4B.	Ad.	B.	2 1/2	2 1/4	10	24	0-±1/4	0-1/2	1/32-3/32	4	8
OH	O...	112	AC-K11	2-1/8	1-3/16	7/8	R..	1 11/32	30	1 13/32	30	11/32	.006H	.013H	.006	9B....	3 1/4B.	.020	.040	5B...	1 3/4B.	Au.	A.	2 1/8	1 1/16	5	14	2 3/4 ± 1/2	1 ± 1/2	1/4-1/8	7°10′	9
OH	O...	112	AC-K11	2-1/8	1-1/16	7/8	R..	1 11/32	30	1 13/32	30	11/32	.006H	.013H	.006	9B....	3 1/4B.	.020	.040	5B...	1 3/4B.	Au.	A.	2 1/8	1 1/16	5	14	0	1/4-3/4	1/4-1/8	7 3/4	10
LH	G...	155x	Ch-J-8	2-1/8	2-5/32	15/32	F..	1 21/32	45	1 13/32	45	.340	.008H	.010H	.014	TC...	TC...	.020	.025	2A...	3/4A..	Au.	A.	2 1/8	1 1/4	5	20	1 1/2	(a)	0-1/8	4 1/2-6	11
LH	G...	155x	Ch-H-10	2-1/8	2-5/32	15/32	F..	1 13/16	45	1 13/16	45	.340	.006H	.010H	.011	2B....	3/4B..	.018	.025	3A...	1 1/4A.	Au.	A.	2 3/16	1 1/8	6	22	1 1/2	(a)	0-1/8	4 1/2-6	12
LH	G...	150x	Ch-H-10	2-1/8	2-5/32	15/32	F..	1 13/16	45	1 13/16	45	.340	.006H	.010H	.011	2B....	3/4B..	.018	.025	5A...	2A...	Au.	A.	2 3/16	1 1/8	6	21	2	(a)	0-1/8	4 3/4-6	13
LH	G...	150x	Ch-H-10	2-1/8	2-5/32	15/32	F..	1 13/16	45	1 13/16	45	.340	.006H	.010H	.011	2B....	3/4B..	.018	.025	5A...	2A...	Au.	A.	2 3/16	1 1/8	6	17	2	1/4-3/4	0-1/8	4 1/2-5 1/2	14
LH	G...	110	Ch-J-9	2-3/32	2-5/32	7/8	F..	1 23/32	30	1 23/32	45	.342	.009	.009	.016	7 1/2B.	3 1/2..	.015	.025	3 1/2B.	1 1/4..	Au.	A.	2	2 3/16	7	28	1-2 1/2	1	0-1/8	6	15
LH	G...	....	Ch-H-10	2-3/32	2-3/32	7/8	F..	1 23/32	30	1 23/32	45	.342	.009	.009	.016	7 1/2B.	3 1/2..	.015	.025	3 1/2B.	1 1/4..	Au.	A.	2	2 3/16	7	28	1-2 1/2	1	0-1/8	6	16
LH	G...	155x	Ch-J-8	2-1/8	2-5/32	15/32	F..	1 21/32	45	1 13/32	45	.340	.008H	.010H	.014	TC...	TC...	.020	.025	2A...	3/4A..	Au.	A.	2 1/8	1 1/4	5	20	1 1/2	(a)	0-1/8	4 1/2-6	17
LH	O...	140x	Ch-J-8	2-1/8	2-5/32	15/32	F..	1 13/32	45	1 13/32	45	.340	.006H	.008H	.011	6A....	2 1/2A	.020	.025	4A...	1 1/2A	Au.	A.	2 1/16	1	5	16	2	1/4-3/4	0-1/8	4 1/2-5 1/2	18
PH	R...	....	Ch-6M	3-1/8	1-3/16	1 1/16	F..	1 1/2	30	1 7/16	30	11/32	.015C	.015C	.025	6B....	2B...	.021	.025	1 1/2°B*	.....	Ad.	..	2 7/16	1 3/4	12	32	3	1	1/4	....	19
OM	O...	150y	Ch-H-10	2-7/32	1-5/32	.687	F..	1.28	45	1.28	45	.279	.013C	.013C	.013	9 1/2B..	.....	.015	.025	4B...	.....	Au.	..	1.60	1.54	4	15.2	8	1	1/8-1/8	8	20
OM	O...	100	Ch-7	2-3/32	1-3/32	.750	F..	1 1/32	45	1 1/32	45	.310	.013C	.013C	.013	9 1/2B.	3B....	.015	.025	4B...	1 1/4B.	Au.	A.	2	1 1/16	5	22	8	1	1/8-1/8	8	21
OH	R...	115	Ch-7	2-3/32	1-3/16	1/8	R..	1 23/64	30	1 11/64	45	1/16	.010H	.010H	.012	4 1/2B..	1 1/2B.	.018	.025	2B...	3/4B..	....	A.	1 1/16	1 1/8	5	11	4 1/2-5 1/2	1	1/8-1/8	7 1/2	22
OH	R...	120	Ch-J-9	2-3/32	1-1/16 1-3/32	1/8	R..	1 23/64	30	1 21/64	45	1/16	.010H	.010H	.012	2A....	3/4A..	.018	.025	TC...	TC...	....	A.	2 1/16	1 1/8	5	15	4-4 1/2	1	1/8-1/8	7 1/2	23
OH	R...	120	Ch-J-9	2-3/32	1-1/16 1-3/32	1/8	R..	1 23/64	30	1 21/64	45	1/16	.010H	.010H	.012	4 1/2B..	1 1/2B.	.018	.025	4A...	1 1/2A.	....	A.	2 1/16	1 1/8	5	15	3-4	1	1/8-1/8	7 1/2	24
OH	R...	120	Ch-J-9	2-3/32	1-1/16 1-3/32	1/8	R..	1 23/64	30	1 21/64	45	1/16	.010H	.010H	.012	4 1/2B..	1 1/2B.	.018	.025	4A...	1 1/2A.	....	A.	2 1/16	1 1/8	5	15	3-4	1	1/8-1/8	7 1/2	25
HM	G...	110	Ch-J-8	2-3/32	2-1/16	3/4	F..	1 3/8	45	1 3/8	45	3/8	.006	.008	.010	10°-3/8B	4B...	.020	.022	TC...	TC...	Au.	A	1 1/16	1 3/8	5	13	0-1/2	1-1 1/2	0-1/8	7	26
HM	G...	110	Ch-H-10	2-3/32	2-1/16	3/4	F..	1 1/2	45	1 3/8	45	3/8	.006	.008	.010	10°-3/8B	4B...	.020	.022	TC...	TC...	Au.	A.	1 1/16	1 3/8	7	20	0-1/2	1-1 1/2	0-1/8	7	27
BH	S...	155x	AC-K7	2-1/8	2-5/32	7/8	F..	1 7/8	45	1 5/8	45	.341	AA...	AA...	AA	TC...	TC...	.015	.026	5B...	2 1/4B.	Ad.	A.	2 1/32	2 3/32	7	25	1/4-1	1/4-1	1/32-3/32	4°-51′	28
OM	O...	105	Ch-7	2-1/8	2-5/32	7/8	F..	1 11/16	45	1 11/16	45	1/16	.004C	.006C	.004	21B..	6 3/4B.	.015	.022	7B...	2 1/4B.	Au.	B.	2 1/16	2	12	32	8	1	1/16-1/8	7 1/2	29
OM	O...	100	Ch-H-10	2-3/32	1-3/32	1/16	F..	1.54	45	1.54	45	.311	.013C	.013C	....	19 1/2B	6 1/4B	.015	.029	4B...	1 1/4B.	Au.	A.	2 1/16	1.57	6	27	4	3/4	1/8-1/8	4	30
BH	G...	100	AC-45	2-1/8	2-5/32	7/8	F..	1 3/4	45	1 43/64	45	.372	.008H	.015H	.008H	24B...	4 1/4B.	.022	.027	4Bm	1 1/4B	Au.	A.	2	1 21/64	7	17	2 1/2	1 1/2	1/8	7	31
BH	G...	.90	AC-45	2-1/8	1-1/8 1-3/16	7/8	F..	1 21/32	45	1 43/64	45	.372	.008H	.015H	.008H	20B...	7 1/2B.	.020	.027	9Bm	2 1/2B.	Au.	B.	2	1 13/64	7	18	2	1 1/2	1/8	7	32
BH	G...	100	AC-G8	2-1/8	2-5/32	7/8	F..	1 21/32	45	1 47/64	45	.340	.015	.015	.015	5A....	1 1/2A.	.022	.025	TC..	TC...	Au.	A.	2	1 21/64	6	20	2 1/2	1 1/2	1/8	7	33
BH	S...	146x	AC-K9	2-1/8	2-3/16	15/32	P..	1 9/16	30	1 23/64	45	11/32	.008H	.011	(k)	5B....	2B...	.020	.040	TC...	TC...	Au.	A.	2 1/16	1 3/8	6	16	0-N 3/4	1/8-1	1/8-1/8	4°51 1/2′	34
BH	S...	152x	AC-K9	2-1/8	2-3/16	15/32	P..	1 1/16	30	1 27/64	45	11/32	.008H	.011	(n)	TC...	TC...	.015	.030	2B...	3/4B..	Au.	A.	2 1/16	1 3/8	7	20	0-N 3/4	1/8-1	1/8-1/8	4°51 1/2′	35
H...	O...	110	AC-Y4 (z)	2-1/8	1-3/16	7/8	F..	1.57	30	1.40	45	.340	.007H	.010H	.....	5B....	.....	.015	.025	4B...	1 1/2B.	Au.	..	2 3/32	1 1/4	7	17	2 1/2 ± 1/2	1 ± 1/4	1/8 ± 1/8	1 1/2	36
H...	O...	110	AC-Y4 (z)	2-1/8	1-3/16	7/8	F..	1 13/16	30	1 13/16	45	.340	.007H	.010H	.....	5B....	.....	.015	.025	7B...	2 3/4B.	Au.	A.	2 3/32	1 1/4	7	20	2 1/2 ± 1/2	1 ± 1/4	1/8 ± 1/8	1 1/2	37
H...	O...	110	AC-Y4 (z)	2-1/8	2-5/32	7/8	F..	1 23/32	45	1 13/16	45	.340	.006H	.008H	.....	30B...	9 3/4B.	.015	.025	6B...	2 1/4B.	Au.	B.	2 3/16	1 3/8	8	24	2 1/2 ± 1/2	1 ± 1/4	1/8 ± 1/8	1 1/2	38
BPH	O...	110	AC-Y4 (z)	2-1/8	2-5/32	7/8	F..	1 11/64	45	1 13/32	45	.340	AA...	AA...	.....	TC...	TC...	.020	.025	6B...	2B...	Au.	B.	2 1/2	2 1/4	10	40	(b)	1-±1/4	1/8 ± 1/8	1 1/2	39
Ste.	R...	80	Ch-J-6	2-1/8	2-5/32	7/8	F..	1 23/64	45	1 9/16	45	.372	AA...	AA...	.010	5A....	1 1/2A.	.018	.025	2B...	1/2B.	Ad.	A.	2 1/4	1 1/4	10	25	1 1/4	1	1/8	8	40
Ste.	R...	85	Ch-J-6	2-1/8	2-5/32	7/8	F..	1 23/64	45	1 9/16	45	.372	AA...	AA...	.004	19B...	6B...	.018	.025	5B...	1 1/2B.	Ad.	A.	2 1/8	1 1/8	13	38	1 1/4	1	1/8	8	41
Ste.	R...	85	Ch-J-6	2-1/8	2-5/32	7/8	F..	1 23/64	45	1 9/16	45	.372	AA...	AA...	.004	19B...	6B...	.018	.025	5B...	1 1/2B.	Ad.	A.	2 1/8	1 1/8	13	38	1 1/4	1	1/8	8	42
LH	O...	145x	Ch-J-8	2-1/8	2-5/32	15/32	F..	1 13/32	45	1 13/32	45	.340	.006H	.008H	.011	6A....	2 1/2A.	.020	.025	4A...	1 1/2A	Au.	A.	1 13/16	1	5	15	1-3	1/4-3/4	0-1/8	4 1/2-5 1/2	43
LH	O...	145x	Ch-J-8	2-1/8	2-5/32	15/32	F..	1 13/32	45	1 13/32	45	.340	.006H	.008H	.011	6A....	2 1/2A.	.020	.025	4A...	1 1/2A.	Au.	A.	1 13/16	1	5	15	1-3	1/4-3/4	0-1/8	4 1/2-5 1/2	44
HM	S...	141x	AC-K7	2-1/8	1-3/16	15/32	R..	1 13/32	30	1 13/32	45	.310	.012H	.012H	.015	5B....	2B...	.020	.025	4B...	1 1/2B.	Au.	A.	2	1 1/16	6	16	N 3/4-1 1/4	3/4-1 1/4	0-1/8	4 1/2-5	45
HM	S...	141x	AC-K7	2-1/8	1-3/16	15/32	R..	1 13/32	30	1 13/32	45	.310	.012H	.012H	.015	5B....	2B...	.018	.025	4B...	1 1/2B.	Au.	A.	2	1 1/16	7	19	N 3/4-1 1/4	3/4-1 1/4	0-1/8	4 1/2-5	46
LH	R...	105	Ch-8	2-1/8	1-3/16	7/8	R..	1 15/32	45	1 9/32	45	11/32	.016C	.016C	.020	15B...	5 1/2B.	.020	.025	2B...	3/4B..	Au.	A.	2 3/16	1 3/8	5 1/2	13	1 1/2	1/2	1/8-1/8	5 1/2	47
LH	R...	105	Ch-8	2-1/8	1-3/16	7/8	R..	1 15/32	45	1 9/32	45	11/32	.016C	.016C	.020	15B...	5 1/2B.	.020	.025	2B...	3/4B..	Au.	A.	2 1/16	1 3/8	5 1/2	13	(a)	1/2	1/8-3/32	5 1/2	48
LH	R...	....	Ch-8	2-1/8	1-3/16	7/8	R..	1 15/32	45	1 9/32	45	11/32	.016C	.016C	.020	15B...	5 1/2B.	.020	.025	TC...	TC...	Au.	A.	1 7/8	1 1/16	8	15 1/2	(a)	1/2	1/8-3/32	5 1/2	49
BH	G...	110	Ch-J-8	2-3/32	2-3/16	3/4	F..	1 3/8	45	1 3/8	45	3/8	.006	.008	.010	10°-3/8B	4B...	.020	.022	TC...	TC...	Au.	A.	1 13/16	1 3/8	5	13	0-1/2	1-1 1/2	0-1/8	7	50
BM	G...	.87	Ch-C-7	3-3/32	1-3/16	15/16	F..	1 17/32	45	1 15/32	45	.371	.004H	.006H	.010	TC...	TC...	.020	.025	5A...	1A...	Au.	A.	1 1/16	1 13/16	4	11	3	2	1/32	7 1/2	51

MAKES OF UNITS

‡—Owen-Dyneto for Generator and Starter
A—Autolite
AC—AC Spark Plug Co.
BA—Burgess or AC
B&B—Borg and Beck
BH—Bendix, Hydraulic
BM—Bendix, Mechanical
BO—Buffalo or Oldberg
BPH—Bendix, power operated, hydraulic
BS—Briggs & Stratton
Buf—Buffalo Pressed Steel
Bur—Burgess **Car**—Carter
CG—Chandler-Groves
Ch—Champion
Col—Columbia
D—Delco-Remy
DA—Delco-Remy Generator and Starter, Autolite Coil and Distributor
Del—Delco
Dia—Continental Diamond Fiber
DL—Detroit Lubricator
Det—Detroit **Exi**—Exide
F-O—Float-O **G**—Gemmer
Ge—General Electric Co.
Han—Handy
HM—Bendix hydraulic and mechanical combined
Ill—Illinois
LB—Link Belt
LH—Lockheed hydraulic
Mar—Marvel **Mec**—Mechanics
Mor—Morse Chain Co.
Nat—National
NS—Noblitt Sparks
O—Own
OH—Own hydraulic
Old—Oldberg
OM—Own, mechanical
OP—Own, power operated
Os—Own, semi-centrifugal
PD—Presto-Lite or Delco
Pur—Purolator
R—Ross
S—Saginaw
SC—Stromberg or Carter
SM—Stromberg or Marvel
Spi—Spicer
Ste—Stewart-Warner
Str—Stromberg
Th—Thompson Products
Til—Tillotson
Tim—Timken
UP—Universal Products
Wal—Walker
WG—Warner Gear
Whit—Whitney **Wil**—Willard

Motor Car Price, Weight and Body Table

Following are delivered prices at factory for cars with standard equipment and include all federal taxes with exception of Ford and Lincoln. Optional equipment, state or local taxes, transportation charges and finance charges are extra.

BODY, MAKE AND MODEL	Delivered Price	Shipping Weight
BUICK *—6 Wheel Equipment		
Special 40		
Sedan, 2d	914	3490
Tour. Sedan, 2d.	940	3480
Sedan, 4d	950	3510
Tour. Sedan, 4d.	976	3490
Bus. Coupe, 2d.	868	3380
Sport Coupe, 2d.	930	3445
Conv. Coupe, 2d.	1011	3480
Conv. Phae., 4d.	1257	3630
Century 60		
Sedan, 2d	1127	3720
Tour. Sedan, 2d.	1152	3750
Sedan, 4d	1162	3750
Tour. Sedan, 4d.	1188	3720
Sport Coupe, 2d.	1142	3660
Conv. Coupe, 2d.	1224	3715
Conv. Phae. 4d.	1479	3840
Roadmaster 80		
Phae., Conv., 4d*	1756	4214
Tour. Sedan, 4d.	1418	4159
For. Sed., Tk., 4d	1541	4229
Limited 90*		
Tour. Sedan, 4d.	2140	4549
Lim. Trunk, 4d.	2242	4599
Tour. Sedan, 4d.	1966	4469
Fo. Tour. Sed. 4d	2140	4409
CADILLAC		
V8 Series 60		
Sport Coupe	1555	3710
Tour. Sedan, 4d.	1660	3845
Conv. Coupe, 2d.	1690	3745
Conv. Sedan, 4d.	2020	3885
V8-Series 65		
Tour. Sedan, 4d.	2090	4385
V8-Series 70		
Sport Coupe	2805	4285
Tour. Sedan, 4d.	2595	4420
Conv. Coupe, 2d.	2905	4325
Conv. Sedan, 4d.	2960	4460
V8-Series 75		
Tour. Sedan, 5p.	2815	4745
Formal Sed., 5p.	3685	4745
Town Sedan, 5p.	3325	4780
Conv. Sedan, 5p.	3630	4980
Tour. Sedan, 7p.	2970	4825
Imp. Tr. Sed., 7p.	3170	4985
Sp. Tr. Sedan 7p	2610	4825
Sp. l. T. Sed., 7p.	2810	4985
Bus. Tr. Sed., 8p.	2745	4825
Bus.l. Tr. Sed. 8p.	2950	4985
Town Car, 7p	4755	5055
V12-Series 85		
Tour. Sedan, 4d.	3535	5050
Tour. Sedan, 4d.	3690	5130
Im. Tr. Sed., 4d.	3890	5165
Town Sedan, 4d.	4045	5000
Formal Sed., 4d.	4400	5050
Conv. Sedan, 4d.	4350	5165
Town Car, 4d	5475	5230
V16-Series 90		
Coupe	7645	5840
A. D. Coupe	7800	6050
Conv. Sedan	8105	6100
Town Sedan	7495	6085
Sedan, 7p	7595	6190
Limousine	7800	6190
Imp. Cabriolet	8055	6210
Tn. Cabriolet, 5p.	9025	6100
Tn. Cabriolet, 7p.	9130	6390
Sedan, 5p.	7545	
Lim. Bro., 7p.	9025	6190
Imp. Cab., 7p.	8105	6210
Conv. Coupe, 5p.	8105	6000
CHEVROLET		
Master		
Sedan, 4d	667	2845
Coach, 2d	606	2800
Twn.Sed.,Trk.,2d	624	2830
Spt. Sed., Trk., 4d	685	2885
Bus. Coupe, 2d.	588	2770
Cabriolet, 2d	694	2790
CHEVROLET (Cont.)		
Master De Luxe		
Sedan, 4d	739	2935
Coach, 2d	672	2910
Tn. Sed., Trk., 2d.	690	2935
Spt.Sed.,Trk.,4d.	757	2960
Bus. Coupe, 2d.	655	2840
Sport Coupe, 2d.	693	2880
CHRYSLER		
Royal Six		
Bus. Coupe, 2d.	810	3049
Coupe, 2d	860	3099
Conv. Coupe	1020	3274
Tour. Bro., 2d.	880	3094
Brougham, 2d	870	3114
Tour. Sedan, 4d.	920	3134
Sedan, 4d	910	3124
Conv. Sedan	1355	3484
Sedan, 7p., 4d.	1145	3544
Sed. Lim., 7p., 4d	1245	
Imperial Eight		
Bus. Coupe, 2d.	1030	3374
Coupe, 2d	1070	3449
Tour. Bro., 2d.	1070	3544
Tour. Sedan, 4d.	1100	3564
Conv. Coupe	1170	3609
Conv. Sedan, 4d.	1500	3824
Custom Imp. 8		
Sedan, 4d., 7p.	2060	4522
Sed. Lim., 4d., 7p	2160	4644
Airflow		
Sedan, 4d	1610	4300
Coupe, 2d	1610	4225
CORD		
Westc. Sed., 4d.	2445	3715
Beverly Sed., 4d	2545	3800
Conv. Coupe, 2d.	2595	3815
Con. Pha. Sed., 2d	2645	3864
Schd. Westh. Sed.	2860	3765
Schd. Bevly. Sed.	2960	3850
Schd. Conv. Cpe.	3010	3865
Schd. Conv. Sed.	3060	3914
Cus. Berline	3060	4120
Cus. Beverly	2960	3900
S. C. Berline	3575	4170
S. C. Beverly	3375	3950
DE SOTO		
Bus. Coupe, 2d.	770	3038
Coupe, rumb., 2d	820	3088
Brougham, 2d	830	3123
Tour. Bro., 2d.	840	3148
Sedan, 4d	870	3123
Tour. Sedan, 4d.	880	3148
Conv. Coupe	975	3225
Conv. Sedan, 4d.	1300	3441
Sedan, 7p., 4d.	1120	3451
Limousine, 7p	1220	
DODGE		
Bus. Coupe, 2d.	715	2902
Coupe, 2d	770	2967
Conv. Coupe, 2d.	910	3057
Sedan, 2d	780	2992
Tour. Sedan 2d.	790	2997
Sedan, 4d	820	2982
Tour. Sedan, 4d.	830	2997
Sedan, 4d., 7p.	1075	3367
Conv. Sedan, 4d.	1230	3262
Limousine, 4d.	1175	
FORD		
V8-60		
Tudor Sedan	544	2513
Tud. Tour. Sed.	569	2523
Fordor Sedan	604	2543
Fordor Tr. Sed.	629	2553
Coupe, 5W	529	2383
Standard V8-85		
Tudor Sedan	585	2728
Tud. Tour. Sed.	610	2760
FORD (Cont.)		
Fordor Sedan	645	2761
Fordor Tr. Sed.	670	2778
Coupe, 5W	570	2608
De Luxe V8-85		
Tudor Sedan	648	2768
Fordor Sedan	708	2783
Roadster	693	2688
Phaeton	748	2803
Coupe, 5W	633	2618
Tud. Tour. Sed.	673	2791
Fordor Tr. Sed.	733	2808
Cabriolet	693	2728
Conv. Sedan	858	2973
Conv. Cabriolet	758	2748
Club Coupe	693	2728
GRAHAM		
Crusader Series 6-85		
Tour. Sedan, 2d.	690	2660
Tr. Sed., Trk., 2d	720	2675
Tour. Sedan, 4d.	770	2695
Tr. Sed., Trk., 4d	795	2715
Cavalier Series 6-95		
Bus. Coupe, 2d.	850	2815
Coupe, 2d	900	2880
Conv. Coupe	945	
Tour. Sedan, 2d.	875	2930
Tr. Sed., Trk., 2d	905	2960
Tour. Sedan, 4d.	905	2930
Tr. Sed., Trk., 4d	935	2945
Supercharger Series 116		
Bus. Coupe, 2d.	1015	2975
Coupe, 2d	1045	3040
Conv. Coupe	1080	
Tour. Sedan, 2d.	1020	3105
Tour. Sedan, 4d.	1050	3125
Tr. Sed., Trk., 2d	1050	3105
Tr. Sed., Trk., 4d	1080	3125
Cus. Su. Chr. Series 120		
Bus. Coupe, 2d.	1105	3020
Coupe, 2d	1135	3055
Conv. Coupe	1170	
Tour. Sedan, 4d.	1160	3200
Tr. Sed., Trk., 4d	1190	3200
HUDSON		
6-73		
Bus. Coupe, 2d.	825	2760
Coupe, 3p., 2d.	870	2805
Brougham, 4d.	895	2925
Tour. Bro., 2d.	920	2925
Vict. Coupe 2d.	915	2865
Sedan, 4d	945	2990
Tour. Sedan, 4d.	970	2990
Conv. Coupe	970	2870
Conv. Bro.	1055	2945
8-74 De Luxe		
Coupe, 3p, 2d	915	3010
Brougham, 2d	970	3105
Vict. Coupe, 2d.	985	3055
Tour. Bro., 2d.	995	3105
Sedan, 4d	1010	3135
Tour. Sedan, 4d.	1035	3135
Conv. Coupe	1050	3020
Conv. Bro.	1135	3125
8-75 Custom		
Coupe, 3p, 2d	1020	3055
Brougham, 4d	1065	3135
Vict. Coupe, 2d.	1070	3085
Tour. Bro., 2d.	1090	3135
Sedan, 2d	1110	3195
Tour. Sedan, 2d.	1135	3195
Conv. Coupe	1145	3070
Conv. Bro.	1230	3160
8-76 De Luxe		
Sedan, 4d	1040	3205
Tour. Sedan, 4d.	1065	3205
8-77 Custom		
Sedan, 4d	1140	3260
Tour. Sedan, 4d.	1165	3260
LA SALLE		
Series 37-50		
Sport Coupe, 2d.	1095	3675
Tour. Sedan, 2d.	1215	3780
Tour. Sedan, 4d.	1260	3810
Conv. Coupe, 2d.	1290	3715
Conv. Sedan, 4d.	1620	3850
LINCOLN V12—136 in. wb.		
Conv. Roadster.	4950	5335
Coupe	4950	5335
Wilby Coupe	5550	
Sedan, 4d	4450	5690
Brunn Vict.	5550	
V12—145 in. wb.		
Wilby. Tour.	5550	
Jud. Berline	5650	5850
Jud. Berline	5750	
Jud. Sed. Lim.	5950	
Brunn Cabriolet.	6650	5835
Brunn Cabriolet.	6750	5810
Brunn Tour. Cab	6950	
Brunn Brougham	6750	5530
Sedan	4750	5840
Limousine	4850	5935
Conv. Sed. LeB.	5450	
Conv. Sed. LeB.	5650	
Wilby. Lim	5850	6000
Wilby Sport Sed.	6850	
Wilby. Panel Bro.	7050	
LINCOLN-ZEPHYR		
Coupe, 3p, 2d	1165	
Sedan, 4d	1265	
Coupe-sedan, 2d.	1245	
Town Lim., 4d	1425	
NASH Lafayette-400		
Coupe, 2d	705	3140
Coupe, 2d	760	3190
A. P. Coupe	770	
Vict. Sedan, 2d.	765	3200
Sedan, 4d	810	3240
Cabriolet, 2d	850	3180
Ambassador Six		
Coupe, 2d	870	3290
Coupe, 2d	910	3340
A. P. Coupe	925	
Vict. Sedan, 2d.	910	3380
Sedan, 4d	960	3400
Cabriolet, 2d	975	3320
Ambassador Eight		
Coupe, 2d	990	3590
Coupe, 2d	1030	3640
A. P. Coupe	1045	
Vict. Sedan, 2d.	1030	3690
Sedan, 4d	1080	3720
Cabriolet 2d	1095	3640
OLDSMOBILE Six		
Bus. Coupe, 2d.	765	3220
Club Coupe, 2d	825	3210
Sedan, 2d	825	3275
Tr. Sed., Trk., 2d	850	3275
Sedan, 4d	875	3310
Tr. Sed., Trk., 4d	900	3295
Conv. Coupe, 2d.	920	3350
Eight		
Bus. Coupe, 2d.	880	3395
Club Coupe, 2d.	940	3405
Sedan, 2d	940	3480
Tour. Sedan, 2d.	965	3480
Sedan, 4d	990	3510
Tour. Sedan, 4d	1015	3495
Conv. Coupe, 2d.	1035	3530
PACKARD *—6 Wheel Equipment		
Model 115-C		
Tour. Sedan	1010	3310
Sedan	995	3265
Club Sedan	1000	3275
Tour. Coupe	960	3235
Sport Coupe	940	3215
Conv. Coupe	1010	3285
Bus. Coupe	895	3140
PACKARD *—6 Wheel Equipment (Cont.)		
Model 120-C		
Tour. Sedan	1185	3520
Sedan	1170	3465
Club Sedan	1175	3455
Tour. Coupe	1135	3435
Sport Coupe	1110	3415
Conv. Coupe	1185	3485
Conv. Sedan	1485	3630
Bus. Coupe	1065	3340
Model 120-CD-Del.		
Tour. Sedan	1400	3550
Club Sedan	1390	3485
Tour. Coupe	1350	3465
Tour. Sed., 7p.	1835	3835
Tour. Lim.	1985	3900
Model 1500 Super Eight		
Tour. Sedan	2480	4530
Model 1501 Super Eight		
Formal Sedan	3400	4795
Tour. Sedan	2685	4670
Club Sedan	2680	4600
Coupe	2660	4595
Coupe	2585	4585
Coupe Roadster	2830	4580
Victoria	3310	4650
Model 1502 Super Eight		
Tour. Sed., 7p.	2860	4700
Tour. Lim., 7p.	2995	4815
Conv. Sed., 5p.	3515	4945
Bus. Sedan	2730	
Bus. Lim	2870	
Model 1506 Twelve		
Tour. Sedan	3670	5335
Model 1507 Twelve		
Formal Sedan	4455	5500
Tour. Sedan	3740	5525
Club Sedan	3845	5520
Coupe	3770	5415
Coupe*	3720	5255
Coupe Roadster*	3750	5255
Victoria*	4815	5345
Model 1508 Twelve		
Tour. Sedan	4070	5600
Tour. Lim.	4275	5660
Conv. Sedan*	4975	5680
PIERCE-ARROW		
Eight Model 1701		
Sedan	3375	5675
Club Sedan	3480	5600
Coupe	3375	5645
Conv. Roadster	3480	5590
Club Berline	3630	
Formal Sedan	3630	
Sedan, 7 p.	3690	5820
Enc. Dr. Lim.	3840	5860
Brunn Town Bro.	5520	5840
Conv. Sedan	4300	
Sedan, 7p.		5725
Twelve Model 1702		
Sedan	3895	5920
Club Sedan	4000	5850
Coupe	3895	5855
Conv. Roadster	4000	5800
Club Berline	4155	
Formal Sedan	4155	
Sedan, 7 p.	4210	6065
Enc. Dr. Lim.	4360	6105
Brunn Town Bro.	6040	6085
Conv. Sedan	4820	5921
Twelve 1703		
Sedan	5015	6125
Enc. Dr. Lim.	5220	6145
PLYMOUTH		
Six P3		
Coupe, 2d	580	2771
Sedan, 2d	620	2841
Sedan, 4d	2841	2841
De Luxe Six-P4		
Coupe, 2p	650	2839
Coupe, 2-4p	700	2884
Conv. Coupe, 2d.	830	2994
Sedan, 2d	715	2899
Sedan, 4d	745	2914
Tour. Sedan, 2d	725	2914
Tour. Sedan, 4d.	755	2914
Sedan, 7p	995	3333
Sedan Lim.	1095	
PONTIAC		
De Luxe Six		
Bus. Coupe, 2d.	736	3140
Sedan, 2d	785	3225
Sport Coupe, 2d.	808	3150
Tour. Sedan, 2d.	810	3210
Cabriolet, 2d	900	3220
Sedan, 4d	836	3235
Tour. Sedan, 4d.	861	3235
De Luxe Eight		
Bus. Coupe, 2d.	812	3270
Sedan, 2d	848	3330
Sport Coupe, 2d	868	3275
Tour. Sedan, 2d.	874	3345
Cabriolet, 2d	940	3345
Sedan, 4d	894	3380
Tour. Sedan, 4d	920	3375
STUDEBAKER		
Dictator		
Bus. Coupe, 3p	765	2965
Cus. Coupe, 3p.	820	3005
Cus. Coupe, 5p	845	3045
Cus. Sedan, 4d.	880	3140
Cruis. Sedan, 4d	900	3130
St.Reg.Cu.Sd.,2d	850	3100
St.Reg.Cr.Sd.,2d	870	3100
President		
Cus. Coupe, 3p.	1085	3510
Cus. Coupe, 5p.	1115	3540
Cus. Sedan, 4d.	1165	3620
Cruis. Sedan, 4d.	1185	3635
St.Reg.Cu.Sd.,2d	1135	3600
St.Reg.Cr.Sd.,2d	1155	3610
State Pres.		
Sedan, Cust.	1195	
Sedan, Cruis.	1215	
Coupe, Cust., 3p.	1115	
Coupe, Cust., 5p.	1145	
TERRAPLANE		
6-71 De Luxe		
Bus. Coupe, 2d.	695	2670
Coupe, 3p, 2d	715	2715
Brougham, 2d.	735	2830
Tour. Bro., 2d.	755	2830
Vict. Coupe, 2d.	760	2765
Sedan, 4d	790	2865
Tour. Sedan, 4d.	810	2865
Conv. Coupe, 2d.	835	2765
Conv. Bro., 2d.	915	2870
6-72 Super.		
Coupe, 3p, 2d	795	2755
Brougham, 2d.	815	2875
Tour. Bro., 2d.	835	2875
Victoria, 2d	835	2795
Sedan, 4d	865	2905
Tour. Sedan, 4d.	885	2905
Conv. Coupe, 2d.	905	2825
Conv. Bro., 2d.	985	2915
WILLYS		
Model 37		
Coupe, 2d	491	2120
Sedan, 4d	545	2250
De L. Coupe	535	
De L. Sedan	590	

Interesting Solder Facts

by James C. Shaw
Gardiner Metal Co.
Chicago

The Solders that are made only of Tin and Lead in the various mixtures or alloys are known as Soft Solders. Those known as Hard Solders are composed of alloys of various metals—they as a general rule have high melting points.

Soft Solders, depending on the alloy of Tin and Lead, have melting points ranging from 358° F. to approximately 500° F. Contrary to the general opinion Lead, which is a Soft Metal, has a higher melting point than Tin, the latter metal being, comparatively speaking, a Hard Metal. The melting point of Tin is approximately 450° F. The melting point of Lead approximately 620° F. In alloying these two metals in making Soft Solders, strange and interesting melting points of the alloys result. As an illustration—equal parts of Tin and Lead or a 50/50 Solder, has a melting point of approximately 415° F. It will be noted that this is a melting point even lower than that of Tin.

An alloy of 63 per cent Tin and 37 per cent Lead, which is known as the Eutectic, or perfect combination, has a melting point of 358° F., almost 100° lower than the melting point of Tin. This alloy, unfortunately, for general work, is not practical. First of all on account of the high cost, and secondly, it flows at too low a temperature for most purposes. This alloy has, however, good tensile strength.

All Solders start to melt at the same temperature, namely 358° F. To turn them into a complete liquid means a greater amount of heat in accordance with the Lead content. It makes no difference whether Soft Solders in various alloys are made in Wire, Bar, Ingot or even a Cored Solder form. They all have the same characteristics.

Fusible Solders are generally of low melting points. They are made of various combinations of Tin, Lead, Bismuth and Cadmium. Some of these alloys melt as low as 120° F. One important use of this type of Solder is in automatic sprinkling systems for fire protection.

Wheel Spinner Fits All Models, Maker States

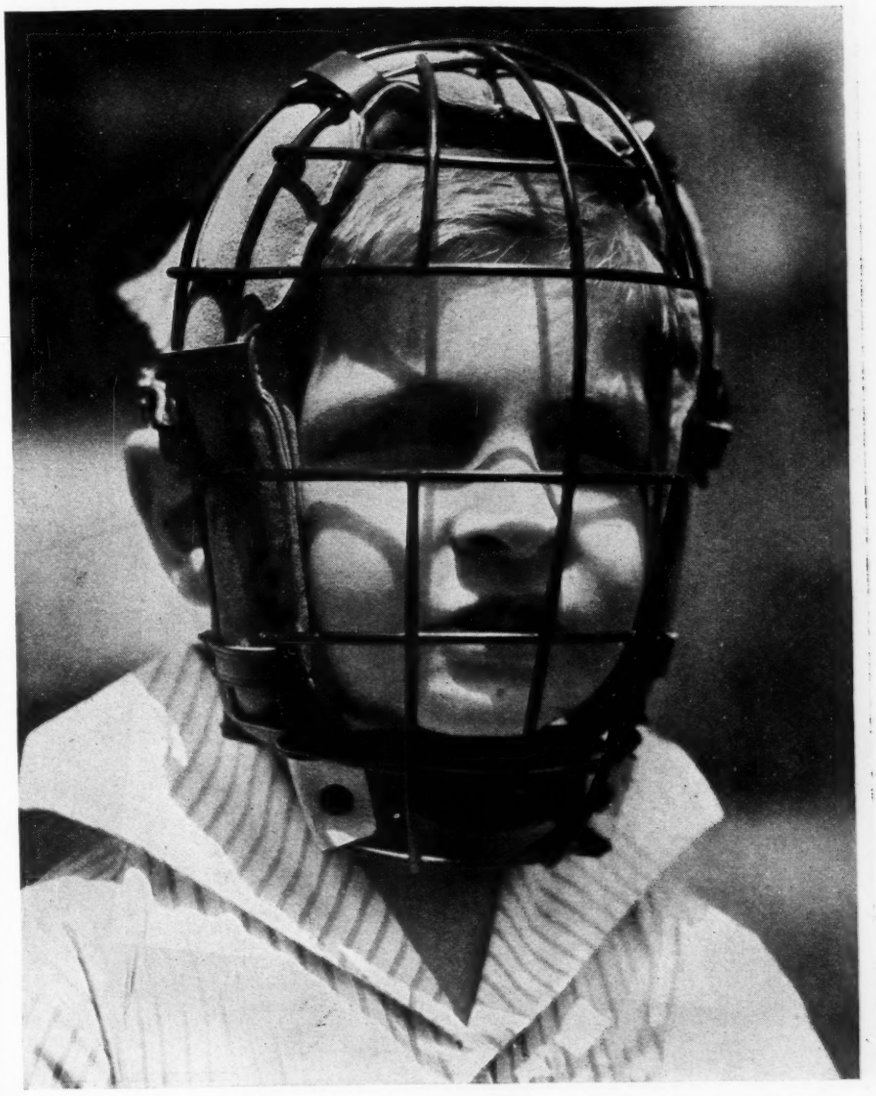
A new Master Wheel Spinner that fits all models of steering wheels, including the banjo type wheel, has been announced by Berkson Products,

Inc., 1809 Indiana Ave., Chicago, Ill. It clamps to the spoke of the wheel and provides easier control and greater convenience in handling. Made with chrome plated die cast base and Catalin onyx knob.

Chexall Accessory Manual

Complete specifications of replacement accessories are contained in Chexall, a manual of over 300 pages and published by the Chek-Chart Corp., 624 S. Michigan Ave., Chicago. It is described as containing all the information needed by the repair shop to get a full share of the billion dollar replacement accessory market. The manual contains factory specifications and parts numbers of windshield wiper arm, starting battery, fan belt, windshield wiper blade, battery ground cable, battery to starter switch cable, ignition cable, fuel and radiator filler caps, oil filter cartridge, generator field fuse, horn, radiator hose connections, lamp bulbs, spark plugs, tires and tubes. Car serial numbers and their location, together with the number of cylinders, and the bore and stroke are provided to permit positive identification of each car model. In addition, the manual gives 42 places to look for accessory business, methods of displaying and merchandising accessories, anti-freeze proportion chart, accessory inventory control and accessory cross reference tables.

Chexall manuals can be obtained by writing direct to the Chek-Chart Corp., or from automotive jobbers. Price $5.00 each.



. . . Safe at Home . . .

Amco BRAKE LINING

That's what his mother thinks—*safe at home!* Safe indeed, until into the road he goes, chasing a foul. His mask won't be much protection—there. Bouncing baseballs and boys and *bad brakes* sometimes make a tragic combination. Boys and balls you can't control. Brakes, however, can have AMCO lining. Ask for AMCO—*get* AMCO—and play safe!

ASBESTOS MANUFACTURING CO., Huntington, Ind.

One satisfied customer leads to another
CHEVROLET
HAS A BETTER DEAL FOR AN INDEPENDENT GARAGE-MAN IN YOUR COMMUNITY
Will you get it?

Every good business man knows the value of the "booster" type customer . . . the man who wants a square deal, and talks about it to his friends when he gets it! The new Chevrolet Plan for Independent Garagemen offers you many booster-winning advantages. In operation, it brings you new ways of increasing your business and adding to your profits. It offers a definite way for you to guarantee greater satisfaction to your customers. And finally, the Chevrolet Plan brings you the most liberal of all parts offers. Get the complete facts about this plan. Learn what it means to you, your customers and the growth of your business.

CHEVROLET MOTOR DIVISION
General Motors Sales Corporation
DETROIT, MICHIGAN

CHEVROLET MOTOR DIVISION, *General Motors Sales Corporation*
Parts Merchandising Dept. 7 B-6 • GENERAL MOTORS BLDG., DETROIT, MICH.

Gentlemen:

I am interested in the details of any proposition that will operate to increase the volume and profits gained from my business. Please send me, without obligation on my part, full information concerning the new 1937 Chevrolet Plan for Independent Garagemen.

Name_____ Street_____

City_____ State_____

MAIL THIS COUPON TODAY

NEW!

NEVER BEFORE AN INSTRUMENT LIKE THIS!

More than 50 different tests are made with this astounding instrument—each made with split-hair accuracy hitherto unobtainable.

Take, for example, the *Fuel Pump Test.* Motoscope "500" definitely localizes trouble—pronto! With instrument connected, the repairman immediately knows the full facts about the pump—exactly how much "draw" there is from tank to pump—how much pressure to carburetor. It quickly detects clogged fuel lines and windshield wiper troubles caused by vacuum leaks.

And, mind you, that's just *one* of innumerable tests.

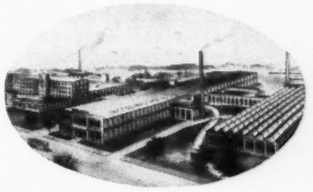
Motoscope "500" is a dazzlingly beautiful instrument. It catches the customer's eye—makes him ask questions—gives you showmanship and salesmanship. It's a real merchandiser, sells more parts and more service for you.

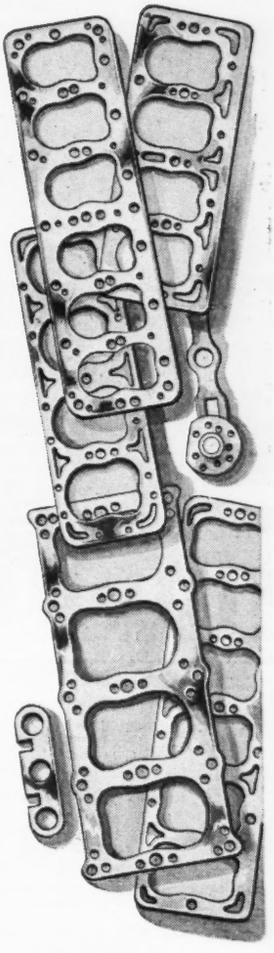
Write TODAY for prices and complete information.

With the new Motoscope "500" you can easily make your shop THE Test and Tune-Up Headquarters in your locality.

STROMBERG
MOTOSCOPE CORPORATION
2709 Belmont Ave., Chicago, Ill.

More and more motorists are asking for *Fitzgerald* GASKETS





Through Fitzgerald's national advertising campaign in TIME, the motoring public is becoming definitely "gasket conscious." Motorists know that for maximum performance, it is important that gaskets do a thorough job of tight sealing. And they know that Fitzgerald Gaskets are best for today's high speed, high compression motors.

National advertising is one of many reasons why it pays you to tie up with Fitzgerald. Ask your jobber for details of Fitzgerald's *complete* service — the right gaskets and grease retainers for all installations . . . The Fitzgerald Manufacturing Company, Torrington, Conn.—Branches, Chicago and Los Angeles — New York Office —Canadian Fitzgerald, Limited, Toronto.

NATIONAL ADVERTISING
Fitzgerald advertising in TIME reaches hundreds of thousands of motorists. More and more people are specifying Fitzgerald.

FITZGERALD GASKETS
THE COMPLETE LINE THAT COMPLETELY SATISFIES

SAFETY LIGHTING

Model No. 326
Triflex Reflector

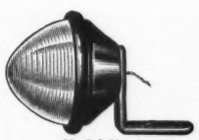
3 Times Better Than Required!

K-D Products beat every known test for engineered quality and far-sighted construction. They exceed I.C.C. requirements . . . and are 3 times better than I.E.S.-S.A.E. specifications.

And you can do THREE times as well with K-D Products than with any other similar safety devices on the market. Prove it to yourself!

FREE

copyrighted chart of I.C.C. regulations on request.



Model No. 506
Clearance Lamp

Model No. 510
Double Marker Light

The K-D LAMP CO.
CINCINNATI, OHIO

This is an Apology

To the many dealers who have not yet received their samples of the new No. 170 Kreger DeLuxe Chromium Tail Light and License Plate Holder and No. 171 Rear Deck Ornament.

A stampede of orders, far greater than any anticipated, quickly depleted our stock. We've increased our facilities now, however, and should be fast catching up on your orders by the time you see this advertisement.

If you missed our ad, you can now get your samples immediately—at a special 50% discount ($1.38 for the No. 170 Kreger DeLuxe Chromium Tail Light and License Plate Holder and 38¢ for the No. 171 Rear Deck Ornament) if you mention your jobber's name.

Sorry it's happened—but thanks for helping to make these new items the hottest numbers we've ever announced.

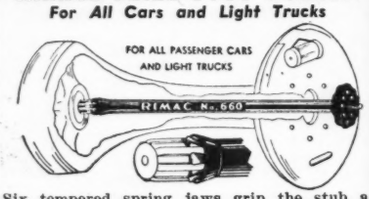
Larry Kreger

The L. F. Kreger Mfg. Co.
544 W. 35th St., Chicago

There are many other real items in the Kreger Line—and more to come.

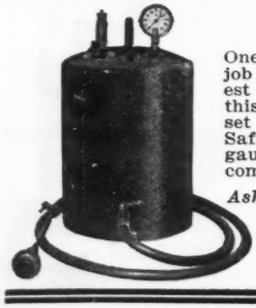
Insist upon your jobber supplying you with genuine Kreger Products.

RIMAC AXLE STUB PULLER
For All Cars and Light Trucks



Six tempered spring jaws grip the stub as you tighten handle. Requires less than ¼" to take hold.
One rear end take down job saved pays for it!
PRICE $3.50
RINCK-McILWAINE, INC.
16 HUDSON ST., N. Y. C.

2 MEN BLEED BRAKES?
NO!



One man can do the job "with the greatest of ease" with this tank and full set of connections. Safety valve, hose, gauge, air valve, complete.

Ask your jobber.

CURTISS & SMITH MFG. CORP.
Pottstown, Pa.

Shop Bookkeeping

(*Continued from page* 57)

to use for the service but does not show a profit. It simple accounts for the article which was used.

Repair work, such as painting and repairing fenders, etc. which cannot be taken care of at the shop and has to be sent to one who specializes, should be taken care of as all regular invoices providing the job was charged. The proper entry would be to write in the name, and the amount goes to Accounts Payable credit and the debit entry goes under Expense debit and given the account number 318 which should be inserted. If the job is paid for at the time it is finished, a check should be made out and on the stub a notation made that it was for "Outside Work", so that when the checks are entered into the Cash Book, the bookkeeper will know just what account to debit or charge. If this particular outside job was for a customer who has a charge account with you, a charge slip should be made out immediately for that customer and the retail price charged or whatever percentage you wish to charge in addition to what it cost you. If this is a cash job, it is taken care of as all cash jobs are.

The purchase of gas, oil, parts, etc. and whatever other purchases for resale, can be easily handled by considering them all Accounts Payable and entering them under the Expense debit column. Instead of trying to keep these resale purchases separate and considering them Cost of Sales, the cost is more easily obtained at the end of each month thru Inventory and this will be fully described in the next issue.

Struebing Service

(*Continued from page* 25)

nected with boat building and maintenance.

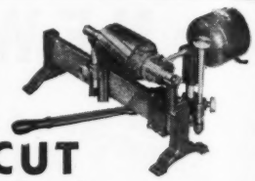
It often happens during the active season that boatowners will call up the Struebing station a few minutes or a few hours before they plan to use their boat and ask that it be checked, gassed and oiled, in readiness for them when they arrive. They may park their cars outside where there is ample room, or store then inside, and thus get to their boat without loss of time. It sometimes happens that owners will order work done on their car while they are out in the boat.

Mr. Struebing makes a point of having good equipment and everything needed to handle any phase of the business in an up-to-date manner. This includes modern valve grinding equipment, generator and starter tester, painting booth, car washing equipment, tire retreading equipment, bandsaw, ripsaw, drill, shaper, planer and emery wheel.

The Struebing garage sells tires, batteries, outboard motors, boats, car heaters, car radios, and other necessities.

One front corner of the garage building has been fitted up as an automobile show room and this is leased to a dealer in Plymouth and DeSoto cars strictly on a cash rental basis with a special arrangement whereby the Struebing garage services this dealer's cars.

A separate machine for Mica Undercutting starter and generator commutators



TRUCUT
Mica Undercutter

Has many improved features. Does the work in a fraction of the time formerly required. Takes bench space 14"x14". Thousands in use. Write for details and price.

FRANK N. WOOD CO.
WAUWATOSA, WIS.

TOUGH TOOLS for TOUGH JOBS
BACKED BY 20 years experience

Hot Shot Grease Tool. Forces grease between spring leaves stopping all squeaks instantly. Order today.

National
MACHINE & TOOL CO.
JACKSON, MICHIGAN

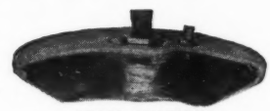
There's Money in Wheel Balancing Service!

Pat. No. 2036757

Many garages are making hundreds of dollars every year by rendering wheel balancing service. Why not you? The cost of an L & H Balancing Stand and Balancing Weights is surprisingly small—but the profits they will earn are surprisingly large. Investigate

HARLEY C. LONEY CO.
16517 Wisconsin, Detroit, Mich.

WRITE for CIRCULAR!



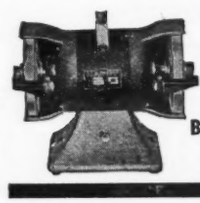
CROSS SECTION

THIS PNEUMATIC POLISHING HEAD IS KIND TO FINISHES

Now you can get the full benefit of a polisher, for with this air-cushioned polishing head you can't hurt a finish. In sets, with lambswool, felt, and cotton covers, and adapter for any motor; or separately. Ask your jobber or write.

Manufactured by
AIR PRODUCTS COMPANY
ROCKFORD, ILL.
Address All Correspondence to
A. F. STRAWSER CO., ROCKFORD, ILL.

BALDOR
BALL BEARING **GRINDERS**



Ruggedly built, Ball Bearing Capacitor type motor protects against burn out. Adjustable tool rests. Guaranteed one year...

$19.50

BALDOR ELECTRIC CO.
4375 Duncan Avenue
St. Louis, Mo.

Now is the season for overhauling SHOCK ABSORBERS

...and here's the way to make it PAY

Hygrade Line AUTOMOTIVE PRODUCTS

DON'T let another season pass without cashing in on Shock Absorber Repairs! The majority of cars that have reached the age of one year NEED Shock Absorber Service.

Nine times out of ten you'll cinch an overhaul job by pointing out to the car owner that worn links, eye bolts and bushings cause shimmy, spring breakage and loss of riding comfort. Hygrade's Assortments for large and small shops, includes these—

TWO SPECIAL DEALS

LJ625A ASSORTMENT—(In Circle)
Dealer's Price $19.85

Contains links, bushings, eye bolts, clevis pins, cup retainers, gaskets, etc., for servicing almost any car. Links include several "Hygrade Universal" types which reduce stock while broadening service. FREE with Assortment: Hygrade Shock Absorber Tool SLT10 (dealer value $3.75) for removing and inserting bushings, and removing links without taking unit from car. Also FREE: Window Streamer, Flat Rate Schedule and VALUABLE SERVICE MANUAL.

LJ630 Assortment (At Right) Dealer's Price $3.75

Special low priced Assortment, containing fastest wearing parts, such as bushings, clevis pins, retainers, etc., for Lovejoy, Monroe and Ford. Service Manual included FREE. Tool SLT10 described at left, listing at $3.75, SPECIALLY PRICED at $3.00 when bought with this assortment.

GET ACTION AT ONCE! If your jobber can't supply you write us for particulars and send us his name.

HYGRADE PRODUCTS CO., 516 W. 34th Street, New York, N. Y.

The

longer a repair job lasts, the more likely it is to win you a permanent customer. Pistons fitted with Thexton Expanders STAY in trim!

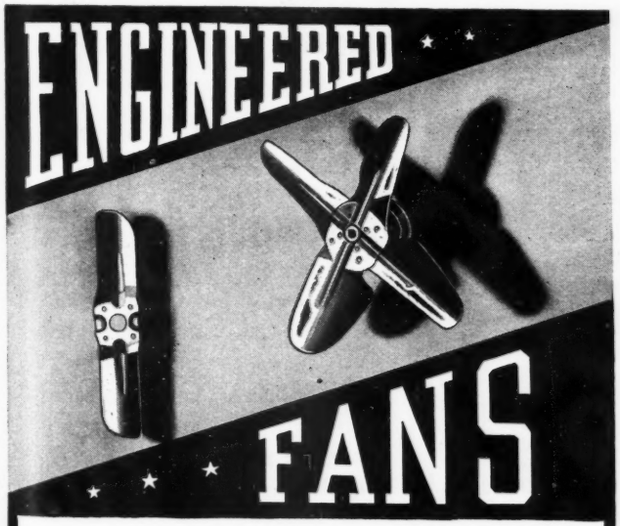
THEXTON

PISTON SKIRT EXPANDERS

THEXTON MANUFACTURING CO., Inc.

Minneapolis, Minnesota
Canadian Branch • Chatham, Ontario

ENGINEERED FANS



FOR FORD AND CHEVROLET...

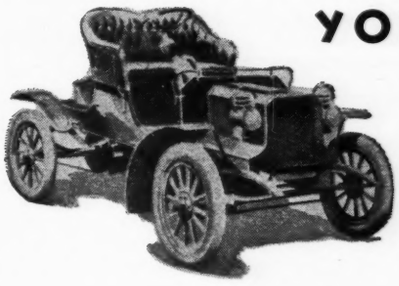
Made of high grade stampings that will stand the gaff. Carefully balanced for satisfactory performance. See our catalog for complete listing.

Send for "Shop Practice" Booklet it's FREE

Wohlert CORPORATION
LANSING, MICHIGAN U.S.A.

EXPORT 116 BROAD ST. NEW YORK, N. Y.

WOULD YOU TRADE YOUR CAR for THIS ?



There's a Heavy Duty Model for Garages, Repair Shops, etc.

Neither would your customers . . . but chances are, the jack they have in their car, "just in case", is just as old-fashioned . . . and clumsy . . . and hard to handle.

The Ace-Hy Hydraulic Bumper Jack is modern . . . modern in appearance . . . in ease of operation . . . in lifting capacity. Nothing to put together, nothing to lose. No projecting levers. Eliminates kneeling or crawling under car. It's a pleasure to use, and a pleasure to sell.

SPECIFICATIONS:

Lifting Capacity	3000 lbs.
Lifting Range	17 Inches
Hook Adjustment	13 Inches
Weight	10 lbs.

Packed in Cloth Bag.
10 in Shipping Container.

VULCAN MFG. CO.

SAINT PAUL • MINNESOTA

FOR QUALITY and
DEPENDABLE SERVICE
DEMAND FROM YOUR JOBBER

LION
DEPENDABLE QUALITY

GUARANTEED
AUTOMOTIVE PRODUCTS

LION AUTO PARTS & MFG. CO., INC.
CHICAGO, ILL. DALLAS, TEXAS

RIESS
Automotive Service Equipment
STEER-O-MASTER
Dynamic Front Wheel Alignment
Heavy Duty Drum Lathes and Grinders
Brake Service Equipment
Money Made With Satisfied Customers
With Our Equipment
RIESS MFG. CO.
Kokomo, Indiana

"EVEREADY"
"PRESTONE"
ANTI-FREEZE
is guaranteed
in Writing

VICTOR
GASKETS
PREDOMINATE in original equipment of motors for passenger cars, trucks, busses, tractors, airplanes, motor boats, and motorcycles.
VICTOR MANUFACTURING & GASKET CO.
P. O. BOX 1333 5750 ROOSEVELT ROAD, CHICAGO, U. S. A.
WORLD'S LARGEST GASKET MANUFACTURER

HACKETT Universal ROLLER
FIG. 2 7 PLY BLADE FIG. 3
FIG. 3
FOR AUTOMATIC WINDSHIELD CLEANERS WIPES CLEAN
NOW IN BIG DEMAND
New Type Universal Blade, fits all arms. Blade rolls in action, no bending of rubbers. 7-ply wiping features give 100% wiping, therefore, clear vision at all times.
HACKETT AUTOMOTIVE ACCESSORIES CORP.
Providence, R. I. U. S. A.
Mfrs. of Wiper Arms, Dual Wiper Attachments, Inside Wipers, License Plate Frames, Cigar Lighters, Magnetic Trouble Lights, Shimmy Stops, Parking and Fender Guides, etc.

Moss Outlines Chrysler Service Functions

T. W. Moss, general service manager for Plymouth, Dodge, DeSoto and Chrysler, spoke in New York, May 12, outlining functions of the Chrysler Motors Service division of which he is head.

"The aim of the Chrysler Motors Service division is to develop better outlets for the sale of Chrysler products, cars, trucks, parts, accessories," he said, "and to make for the dealer a profitable parts and service operation."

The service division has two basic jobs to do, Mr. Moss stated. First is a technical job which deals with the training of some 30,000 dealer employes, so that they know how to service Chrysler products. The other all important job deals with service merchandising. Mr. Moss explained how these aims were carried out in complete detail.

This analysis came at the conclusion of a spring drive on service introduced nationally at a series of 15 regional meetings, held from April 15 to April 24 throughout the country.

Under this national program, Plymouth, Dodge, DeSoto and Chrysler dealers began a campaign to educate car owners on the importance of putting their cars into proper condition for spring and summer driving. As part of the "safety through service" campaign originated by Mr. Moss, dealers were instructed in periodic check-ups to maintain the many safety features built into every Chrysler Corporation car.

Mr. Moss was in charge of meetings in Boston, New York, Philadelphia, Greensboro and Atlanta; T. E. Wisner, service merchandising manager, conducted meetings in Detroit and Pittsburgh; J. W. Alexander, technical manager, took charge at Cincinnati, St. Louis, Kansas City and Dallas. A. E. Cook, special representative, covered the West, stopping in Chicago, Minneapolis, Seattle and Los Angeles.

"Buried Treasure" Free

A new book called "Buried Treasure" Check List, has been introduced by the Acme Card System Co., 8 S. Mich. Ave., Chicago, Ill., and will be sent free to interested parties. It contains a set of questions, the answers to which every Executive and Department Head should know, and indicates clearly the need for new, up-to-date record keeping systems. It points out definite and simple remedies for antiquated record-keeping methods, and thus reveals "Buried Treasures."

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ZECOL WAX TO CAR BEAUTY
The Number One REPEAT item. Attractively packaged, priced right, advertised; sells because of its quality and speed and ease of application. Write today—get your share of the quick profits that are being made with ZECOL WAX and ZECOL SCUM REMOVER.
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PAINTING UNIT
An ideal outfit for all types of material. Comes with the NEW and PHENOMENAL Thor Model 7, Gun—a most efficient Oil and Water Extractor and 25 ft. of 5/16" Air Hose and Connections.
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Makers of complete Spray Finishing Systems — Spray Guns — Material Containers — Regulators—Spray Booths—Exhaust Fans—Hose and Connections—Accessories.
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is without equal for use with Soldering Guns . . . the 1/4 inch round will fit *any* Soldering Gun on the market. Also made in meter bars. Packed in 5-lb. boxes convenient for shop use. Sold by jobbers everywhere at lower prices made possible through modern production methods. Also bar, wire and flux-filled solders and babbitts.

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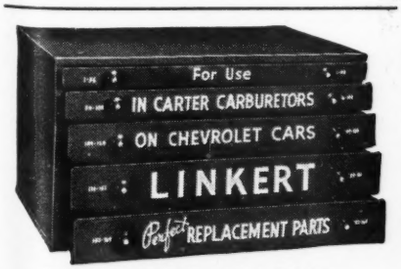


NEW C250 5 METAL DRAWER COMPLETE CHEVROLET ASSORTMENT
Write for C250 Catalogue
L-LINKERT CARBURETOR CO.
INDIANAPOLIS, INDIANA

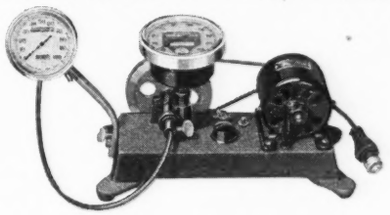
Tail Light and License Plate Holder

A deluxe tail light and license plate holder has just been announced by The L. F. Kreger Mfg. Co., 550 West 35th St., Chicago, Ill. Designed especially for installation on Ford, Chev-

rolet and Plymouth cars, it can be installed on other cars with plain rear decks. A deluxe chromium plated accessory styled in the 1937 fashion. List price, $2.75.

Speedometer Testing Unit

The F. W. Stewart Mfg. Corp., 340 W. Huron St., Chicago, Ill., announces a modern portable calibrating unit complete with eight adaptors



for testing practically every make and model of speedometer, either on or off the car. The master head is a pointer type having a scale graduated in miles from 0 to 90, also indicating r.p.m. The motor operates on 110 volts, A.C. or D.C. The base of the tester is cast iron with black enamel finish, mounted on rubber feet, and the total weight of the machine is 16 lbs. Price complete, $40.00 net.

Ford V-8 Truck Pictures Wanted

The Ford Motor Company has issued an invitation to amateur photographers to send in action pictures of 1937 Ford V-8 trucks and offers to pay ten dollars for each print accepted.

Amateurs in all sections of the country are expected to respond. Only pictures showing trucks at work, making deliveries, being loaded or unloaded or performing unusual and interesting jobs are wanted.

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Built Right . . . Priced Right
HEIN-WERNER MOTOR PARTS CORP.
Waukesha, Wisconsin

FEW MODELS ENGINEERED TO DO THE WORK OF MANY
HEIN-WERNER hydraulic JACKS

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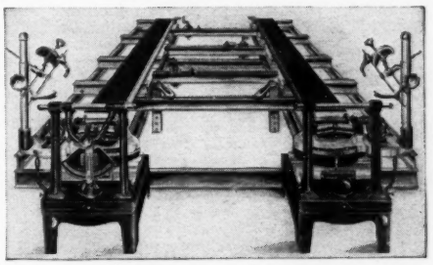

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Chicago, Ill.

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Gentlemen:
I am interested in more information on the following products and how I can purchase Acco equipment out of income.
- ☐ Acco Electro-Lift.
- ☐ Acco Frame and Axle Straightener.
- ☐ Acco-Meter Wheel and Steering Analyzer.
- ☐ Acco Wheel Balancer.
- ☐ Acco Brake Tester.
- ☐ Acco Aut-O-Meter-Combination Acco Frame and Axle Straightener, and Acco-Meter Wheel and Steering Analyzer.
- ☐ Acco Du-O-Meter-Combination Brake Tester and Acco-Meter Wheel and Steering Analyzer.
- ☐ Acco Tri-O-Meter-Combination Aut-O-Meter and Acco-Brake Tester.

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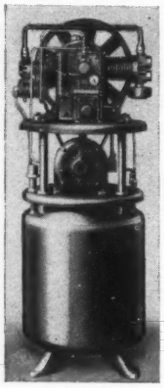
WILMINGTON
COMPRESSORS

When you have this Wilmington Compressor tucked into a corner of your shop, you'll begin to believe in those "free air" signs. For with Wilmington Compressors, maintenance costs are so low your air is practically free except for power charges. An unloader prevents burning out of motor. Non-pulsating check valve is not battered to death, but keeps on working indefinitely without repairs. These are only two of the "extra" features which are standard on Wilmington Compressors. Write for catalog.



AUTO COMPRESSOR COMPANY
Wilmington, Ohio

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An attractive aid to parking, backing, turning, Spin-Ur-Wheel is a fast seller with car owners. Instantly attachable, it fits all steering wheels. In five popular colors, with and without jewel. Base finished in chrome or enamel.

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351-371 N. Crawford Ave., Chicago, Ill.

Radiator, battery repairing and all sorts of soldering jobs easily done with the

TORIT
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Simply connect to Presto Tank. Includes a set of 4 tips. Price, $6.75.

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NOC-OUT
HOSE CLAMPS
THE HOSE CLAMP WITH THE THUMB SCREW

Standard equipment of the automotive industry. Adjustable - one size equals many. Quick tightening, perfect seal. At all Jobbers.

Pat. No. 1,382,813.

WITTEK MFG. CO.
4305 W. 24th Pl., Chicago, U. S. A.

Kit for Repairing Motor Temperature Gages

The latest development of Hygrade Products Co., 516-522 West 34th St., New York City, is a kit for repairing motor temperature gages. Offered in

two sizes, the kit contains 2 types of thermo fluid, a supply of tubing, 3 sizes of cartridges, ferrules, nuts, drills and a thermometer. A complete, 12-page service manual accompanies each kit. A new source of profit for the repairman.

Battery Terminal Puller

A new addition to the line of tools manufactured by the Plomb Tool Co., 2209 Santa Fe Ave., Los Angeles, Cal., is the battery terminal puller illustrated. As any tool used for this purpose is soon affected by battery acid, this puller is designed so that any corroded part can be replaced quickly at low cost. The jaws can be bought for 15c. each. The complete puller sells for $1.15. Jaws are 4⅛ in. long, and all parts are heavily cadmium plated.

Charles N. Teetor

The Perfect Circle Co., Hagerstown, Ind., has announced the death of Charles N. Teetor, Chairman of the board of directors and president of the Perfect Circle Companies, of Hagerstown, Ind., and Toronto, Can. Mr. Teetor died May 2.

Merchandising Stand

A new merchandising stand stocked with fast-selling chassis parts for one hundred popular car and truck models is offered by Thompson Products, Inc., 2196 Clarkwood Road, Cleveland, Ohio. Triangular in design, the stand is 60 in. high, 30 in. wide and 8½ in. deep. Can be used either as a floor or a counter display. The list price of the parts is $155.75, and the stand is included with the standard assortment.

Cut metal finishing costs with the economy roll

Aloxite Brand Aluminum Oxide Cloth in the new economy roll saves you time and money. No cloth wasted. No time wasted cutting out right sized piece. Cloth is "Electrocoated"—every abrasive grain upended with sharp, clean-cutting edges contacting the work.

Quality grinding wheels are a necessity in garage or shop

There are hundreds of jobs that can be done faster and easier with grinding wheels. Get two—a Carborundum Brand Silicon Carbide Wheel for general grinding and an Aloxite Brand Aluminum Oxide Wheel for tools and steel parts and fittings. Order from your jobber.

CARBORUNDUM
ABRASIVE PRODUCTS

Abrasive cloth and sanding discs cut faster and last longer

This cloth in sheet form is electrocoated. Its tough, hard, fast-cutting grains will give you a smoother, more uniform finish than you could ever get with emery. *Specify Aloxite Brand Aluminum Oxide Fibre-Backed Discs for your sanding machine.*

Fast, clean-cutting compound for accurate valve grinding

The abrasive grain in the Carborundum Brand Super-Speed Grinding Compound is absolutely uniform. It assures you positive, true valve seating. There is no ringing or scoring of the valve. Put up in four handy-sized tins. Order them today.

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Flint Loss-Proof Compression SPARK PLUG!

The favorite replacement plug with leading garage and service stations because it produces maximum power not only in the older type of motors but also in the latest type of high-speed, high compression motors.

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DIRECTIONAL SIGNALS
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ELECTRIC FLARES
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The Standard of Safety on the Nation's Highways.

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Medford, N. J.

THE TWIN POWER RINGS OF THE International LINE-

SUPER COMPRESSION CHIEF

OIL CHIEF

You can safely put your faith in Chief Power Rings, and when you recondition the cylinders, use Super-Scraper sets. The oil mileage will be amazing.

THE INTERNATIONAL PISTON RING CO.
CLEVELAND, OHIO.

Equip for Larger Profits!

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SHOP EQUIPMENT
Hydraulic Presses, Wrecking Cranes, Car Washers, Jacks, Trestles, Creepers, Oil Spray Guns, etc.

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MANLEY PRODUCTS CORP.
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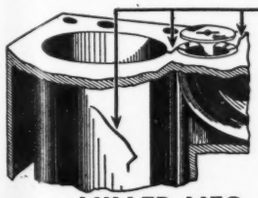
The Quick, Permanent Seal for Aluminum Heads, Valve Port and Inside Cylinder Cracks

WONDER WELD

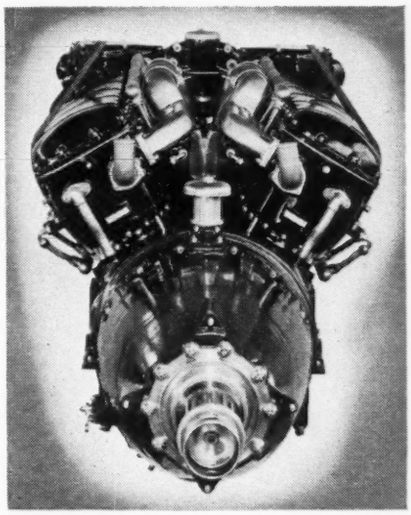


You can keep your customers on the road by sealing valve port and inside cylinder cracks permanently in 30 minutes with Wonder Weld. At your jobbers or write.

MILLER MFG. CO.
1220 Kaighn Ave. Camden, N. J.

Army Approves 1000-hp. V12 Aircraft Engine To Use Ethylene Glycol

The new Allison 1000-hp. aircraft engine, which recently passed its type tests at Wright Field, Dayton, Ohio, is probably the first aircraft powerplant specifically designed to be cooled with ethylene glycol, commercially known as "Prestone," a liquid having a boiling point of 387 deg. F. It is also the first liquid-cooled engine of this size to receive an approved-type certificate.



The engine is a 12-cylinder V design with 60-deg. angle of V; with built-in reduction gear having a ratio of 2:1, and with a centrifugal supercharger which is a part of the accessories housing. It has a cast-aluminum crankcase in two sections, and two cylinder banks, each consisting of a single aluminum-alloy casting containing the combustion chambers and valve mechanism, into which the steel barrels are fitted. The valves, of which there are four per cylinder, are actuated by an overhead, completely inclosed camshaft. The heat-treated steel cylinder barrels, the valve seats and valve guides are pressed and shrunk into the machined cylinder-head castings. Exhaust valves and valve seats are Stellite-faced.

The cooling system permits of locating radiator equipment in places on the plane where it occasions the minimum drag. In fact, the chief advantage of a liquid-cooled engine using a high-boiling-point coolant appears to be that it cuts down the air drag. Such reduction in the drag makes possible the attainment of higher speeds, and it seems that this type of engine offers special advantages for military work and possibly for long-distance commercial flying at high speeds and high altitudes, for which service it would be fitted with a turbo-type of supercharger.

Warner Elected

S. W. Warner was elected secretary of the Timken Detroit Axle Co., to succeed Walter F. Rockwell who remains as vice-president, at an organization meeting of the directors following the annual stockholders' meeting at Canton, Ohio.

SPLAT! SPLAT! SPLAT! millions of bugs hitting hot windshields at fifty, sixty or even ninety miles an hour. You're not lucky enough to dodge all those windshields. Bees, beetles, gnats, grasshoppers, millers, moths, ladybugs —that splat and stick like scotch adhesive.

Hot days, heavy traffic — touchy dispositions and people expecting super service. The scene is set for Houser's Bug Juice Dissolvent! Wipe it on the windshield—then wipe it off. Not even the proverbial gnats eyebrow remains. And you can smile at your customers and mean it.

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Chilton strengthens with 1937 no-waste

Motor World Wholesale, beginning with the issue of July, 1937, will be enlarged from pocket size to standard size, with the same 7" x 10" type page as Motor Age and Automobile Trade Journal.

Its circulation will be concentrated on the leading jobbers who do 85% of the dollar volume in the automotive wholesale field.

Advertising space in Motor World Wholesale will be a plus service to advertisers in Motor Age and Automobile Trade Journal. A page in either of these publications will carry with it the privilege of a page without cost in Motor World Wholesale, and this same privilege goes with fractional pages, too.

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